COMMODORE USERS

# Ahoy!

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NOVEMBER 1987




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Now the world of Wizardry comes to Commodore 64/128
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THE COMMODORE USERS Ahoy! Access

# clipper

Ahoy! *Readers:*

*This month we have some really terrific offers in your* Clipper. *You can SAVE 25% on your first order from* **Free Spirit**, *get a FREE T-SHIRT from* **Avalon Hill**, *SAVE 30% or get a FREE BOX OF DISKETTES from* **Emerald**, *SAVE 5% on the already low discounted prices from* **Floppy House**, *SAVE $10 on an* Ahoy! *Disk Subscription, and even get a beautiful FREE WALNUT STORAGE BOX for your Amiga disks from* **Oxxi**. *Don't miss these golden opportunities! Order TODAY!*

*It all adds up to lots of great savings! And we'll have even more for you in your January issue.*

*Admirally yours,*

Joe Ferguson

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## SAVE 5% ON YOUR FLOPPY HOUSE SOFTWARE ORDER...

Every little bit helps...and when you can SAVE 5% OFF of already low discounted prices, you're way ahead of the game. **Floppy House** in Palmyra, Pennsylvania sells all kinds of wonderful software from arcade and adventure games to educational programs, utilities, and graphics programs. Until November 30, 1987, when you order 2 or more pieces of software at their already outstanding prices, you may take off an extra 5%! In addition, you'll receive a wonderful Bonus Gift, "an excellent public domain version of an arcade game hit on its own disk." Look for the **Floppy House** ad in this month's issue of *Ahoy!* for a listing of their current offerings. If you wish to order by phone with your VISA or MasterCard (at no extra charge), simply call 1-800-633-8699, or if you're in Pennsylvania, call 1-717- 838-8632. Be sure to identify yourself as a member of the *Ahoy!* Access Club to qualify for your added discount. If you prefer to mail in your order, use the handy **Floppy House** coupon on page 3 of this *Clipper.*

Please include $2.50 for shipping and handling on all orders under $100, and Pennsylvania residents need to add appropriate sales tax. **Floppy House** features 48-hour shipping on charge orders or upon receipt of a cashier's check or money order, but that's no reason to wait until the last minute, 'cause this great offer will disappear after November 30, 1987.

## SAVE $10 AND YOUR FINGERS FOR BETTER THINGS...

Wouldn't it be wonderful if you never had to type in the hundreds of lines of *Ahoy!* programs ever again? Well, I have good news...now, you don't! Simply subscribe to the *Ahoy!* Program Disk, and you'll avoid those hours of typing. Usually, the *Ahoy!* monthly disks cost $79.95 for a year of all of the programs printed in the magazine, but for you as a member of the *Ahoy!* Access Club, the cost is only $69.95. Use the *Ahoy!* Program Disk coupon on the opposite page of this *Clipper* to save time. But don't wait too long, because this offer expires December 30, 1987, and may never be repeated.

## 25% OFF YOUR FIRST ORDER FROM FREE SPIRIT...

For a while, **Free Spirit Software**'s advertising has been gracing the pages of *Ahoy!* And now, thanks to your patronage, **Free Spirit**'s product line is bigger than ever. Their experience has been that once you order from them, you'll immediately appreciate the quality of the software and their reasonable prices, and you'll probably find another program in their catalog you can't live without.

**Free Spirit Software**'s current top-selling programs are 1) *1541/1571 Drive Alignment Program* for the 64 or 128 at $34.95; 2) *Super Disk Utilities Package* for the 128/1571 at $39.95 and 3) *The Communicator*, a telecommunications program at $39.95.

Whether you have one 1571 or two, **Free Spirit**'s *Super Disk Utilities Package* includes an appropriate copy program, plus DOS utilities like a file scratcher and a file unscratcher. With this neat program you can also change disk format without affecting data, erase a track or bulk erase a disk. There are CP/M Plus utilities like a disk copier and a disk editor. And there's much more, all for only $39.95.

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**Free Spirit** wants to give you 25% OFF your first order and send you their catalog. And, **Free Spirit**'s policy is always to provide FREE SHIPPING AND HANDLING. You may either clip the **Free Spirit** coupon on page 3 of this *Clipper*, or call **Free Spirit** at (312) 352-7323. VISA and MasterCard are accepted, so why delay? This offer expires December 15, 1987, so send in your order RIGHT AWAY!

## ANNOUNCING COMPUTER DIRECT—A NEW DIVISION OF PROTECTO...

**Protecto Enterprizes**, one of the leaders in the computer discount mail-order business, proudly announces the launch of **Computer Direct**, a new division dedicated to serving you better. Family-owned and family-managed, the company's management includes four brothers, their sister and spouses. With the family keeping a vigilant eye on all phases of the operation, things continue running smoothly.

Recently, the company has been working on improving services. They've installed a mini-computer and upgraded their phone system, while streamlining operations to serve you better.

You've probably noticed the large number of **Computer Direct** pages in each *Ahoy!* issue. That's because **Computer Direct** will consistently win your business with their exceptional support and unusual guarantees. Their 15 DAY FREE TRIAL policy on products including software is among the best in the industry.

So give **Protecto**'s **Computer Direct** a try. I know you'll be impressed, too!

## FREE WALNUT DISK STORAGE BOX FROM OXXI...

**Oxxi**, a relatively new company whose name has become synonymous with landmark software for the Amiga, is pleased to announce their new *Benchmark Modula-2: Software Construction Set* for the Amiga.

**Oxxi**'s new language product delivers a highly efficient environment for developing programs, by integrating the primary tools used in software development: an editor, a compiler, and a linker.

The lightning-fast compiler implements the entire Modula-2 language, as defined by Professor Wirth, creator of PASCAL and Modula-2 languages. Compilation of densely packed programs takes place at an average speed of 10,000 lines per minute with burst speeds of up to 30,000 lines per minute. Once the program is compiled, the editor automatically positions itself at the site of any errors, and displays an error message. The error can then be fixed, and the editor repositioned at the next error by pressing a key. Once all parts of the program have been compiled successfully, the turbo-speed linker, built into the EMACS-style editor is activated by pressing another single key, while still in the editor. The program is then linked into a stand-alone executable file.

The *Benchmark Modula-2: Software Construction Set* has some terrific features, besides those already mentioned: Amiga hardware/software support libraries, including Intuition, ROM Kernal, Amiga DOS, to name but a few; Standard Modula-2 libraries, including FileSystem, InOut, Storage, Terminal, MathLibO, and more; demonstration programs showing the usage of many of the Amiga functions, such as windows, graphics, multi-tasking, menus, gadgets, and many others (some of the demo programs include a freehand paint program and a desktop calculator); and professionally written documentation, consisting of a user's guide and a reference guide totaling over 800 pages.

For all of this Amiga innovation, you would expect the suggested retail price for the *Benchmark Modula-2: Software Construction Set* to be far greater than the mere $199, **Oxxi** is asking. But to sweeten the deal even more, if you order using the **Oxxi** coupon from page 3 of this *Clipper,* **Oxxi** will send you ABSOLUTELY FREE, a Walnut Disk Storage Box valued at $29.95. It's just perfect for storage of your 3½" Amiga disks, and even has walnut compartments. With its recessed handle, it stacks really well. So don't delay. Send for your *Benchmark Modula-2: Software Construction Set L* and FREE DISK STORAGE BOX TODAY!

## GET A FREE T-SHIRT WITH NBA FROM AVALON HILL...

*NBA* is a new basketball game from **Avalon Hill** for the 64 or 128. The game offers three modes of play: Head to Head, Solitaire and Autoplay. Autoplay allows teams to accumulate several games in a row. *NBA* features a Stat Keeper Program. Individual players' performances and other statistics are updated "in real time" during the game, and may be displayed on the screen or typed by the printer. The price for *NBA* is only $39.95, and when you clip the **Avalon Hill** coupon on page 3 of this *Clipper,* and send it along with the coupon from the *NBA* box, they'll send you a FREE **Avalon Hill** T-SHIRT! This offer expires December 15, 1987, so look for *NBA* at your favorite local software outlet soon. Please allow 6 to 8 weeks for delivery.

## SAVE 30% ON FREE BOX OF DISKETTES FROM EMERALD...

The FSD-2 Disk Drive from **Emerald Component International** is a real jewel of a drive. Its direct drive mechanism is more reliable than the belt-driven type found in the FSD-1 and the Commodore 1541. This enhanced reliability is reflected in the 1-year warranty, not just 3 months offered by Commodore. The well constructed FSD-2 has an external power supply, which virtually eliminates the possibility of overheating. It's about one-half the size of the Commodore drive with a slim-line design and metal chassis. With an improved operating system, you'll find it's somewhat faster and quieter than the 1541. And the FSD-2 even has a switch which allows you to change the device number at any time, with no case opening necessary. **Emerald** also has an excellent policy: Your SATISFACTION IS GUARANTEED.

Now and for a limited time, when you buy the FSD-2 from **Emerald Component International**, you may take your pick of the following offers: 1) 10 FREE DISKETTES, 2) 30% OFF the Quickshot II Joystick, regularly selling for $19.95, but with discount only $13, 3) 30% OFF their 300 Baud Modem, regularly $30, 4) 30% OFF their 1200 Baud Modem, regularly $129, or 5) 30% OFF their Slimline Case, regularly $29.95. Simply complete the **Emerald** coupon on page 3 of this *Clipper,* and send it with your order. You will need to add $20 for shipping and handling of the FSD-2, plus $5 for shipping and handling on any of the hardware offers. If you wish to order by phone, you may call 1-800-356-5178, or in Oregon, 1-503-683-1154 and order with your credit card. But in order to get the savings, be sure to mention that you saw this offer in the *Ahoy! Clipper.* This offer expires December 15, 1987, so be sure to mail or phone in your order TODAY!

## SUBSTANTIAL SAVINGS ON COMMODORE IBM-COMPATIBLE SYSTEM FROM LYCO COMPUTER...

Many of us have toyed with the idea of buying an IBM-compatible system, but heretofore, the cost has been prohibitive. Well, now **Lyco** has an offer that is very tempting. For a limited time, **Lyco** is offering the Commodore PC 10-II, Commodore's IBM PC-compatible machine with the Thomson 4120 Color Monitor for only $798.

The 10-II features 640K in memory, and has two 5¼" disk drives. It comes packaged with *Side Kick*, a desktop program which my wife has found invaluable. *Side Kick* provides a notepad, a calendar, a calculator, an ASCII table and an auto dialer. The 4120 is an RGB Monitor, and comes with cables for IBM PC compatibles. The system comes with a full 1-year warranty. The suggested retail prices for the computer, monitor and program are $899.95, $348.95, and $84.95, respectively, so you're SAVING OVER 40%!

In each issue of *Ahoy!*, you'll find two pages of great computer offerings from **Lyco Computer. Lyco** sells a wide variety of Commodore-compatible hardware and software at good prices. To get more details on shipping and handling for the Commodore PC 10-II System, check out **Lyco**'s ad in this month's issue of *Ahoy!* To order your Commodore PC 10-II System, just clip the **Lyco** coupon on page 3 of this *Clipper.* For more information on other hardware and software, you may call them at 1-800-233-8760; in Pennsylvania, call 1-717-494-1030. They will accept phone orders on this offer, but you must mention your membership in the Club. This offer expires on December 15, 1987, so hurry and complete the **Lyco** coupon right away.

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## $5 OFF DI-SECTOR FROM PRECISION PERIPHERALS

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Mail to: Free Spirit Software, Inc.
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Mail to: Ion International Inc.
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YES, **Ahoy!**, I want to SAVE $10 on your Program Disk. Enclosed is my payment of $69.95. Now I can save my fingers for better things. Thanks!

## FREE WALNUT DISK STORAGE BOX FROM OXXI

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YES, **Oxxi**, I want your FREE DISK STORAGE BOX, valued at $29.95. Enclosed is my payment for your *Benchmark Modula-2: Software Construction Set,* $199, plus $4.50 for shipping and handling, a total of $203.50.

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## FREE T-SHIRT FROM AVALON HILL

Mail to: Avalon Hill Inc.
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YES, **Avalon Hill**, I want my own FREE T-SHIRT. Enclosed is the coupon from my own copy of *NBA*. My size preference is indicated here: ☐ Small ☐ Medium ☐ Large.

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Mail to: Emerald Component International
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YES, **Emerald**, I want to take my pick of the options listed below. Enclosed is my order for the FSD-2 at $159, plus $20 for shipping and handling. I have indicated my choice of offer below, and I have added $5 for shipping and handling on any of the hardware offers. Thanks!

☐ I want to SAVE 30% on the Quickshot II. Enclosed is my additional payment of $13, plus $5 for shipping and handling.
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☐ I want to SAVE 30% on your 1200 Baud Modem, regularly $129. Enclosed is my additional payment of $90.30, plus $5 for shipping and handling.
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YES, **Floppy House**, I want to SAVE 5% on your already-discounted software. Enclosed is my order for two or more programs. Also, enclosed is $2.50 for shipping and handling, if my order is under $100. Thanks! Pennsylvania residents: please add appropriate sales tax. VISA and MasterCard accepted (at no extra charge).

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# Ahoy!

## CONTENTS

## DEPARTMENTS



## FEATURES



## PROGRAMS



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| 1361 | $459 |

### Zenith:

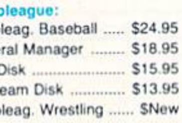
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|---|---|
| ZVM 1220 | $89 |
| ZVM 1230 | $89 |

### NEC:

| | |
|---|---|
| Multisync | $549 |

### THOMSON 4120 Monitor

- 14" RGBI/video composite/analog
- Compatible with IBM and Commodore
- RGB data cable included



**$225.95**

## Modems

### Avatex:

| | |
|---|---|
| 1200i | $99 |
| 1200hc Modem | $99.95 |
| 2400 | $219 |
| 2400i | $CALL |

### Hayes:

| | |
|---|---|
| Smartmodem 300 | $125 |
| Smartmodem 1200 | $369 |
| Smartmodem 2400 | $559 |

### SKC T120 VHS Video Tape:

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| each | $4.49 |
| 3 pack | $12.75 |
| 10 pack | $39.90 |

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# VIEW FROM THE BRIDGE

At least two or three times a week, we in the *Ahoy!* editorial offices look out over the sea of printing 128's, telecommunicating 64's, and multitasking Amigas and think how lucky we are to be writing about microcomputers, rather than skin diving or cars or photography. This industry sometimes seems like a cross between the front page of *The New York Times* and an ABC miniseries, complete with scientific breakthroughs, corporate power struggles, and rags-to-riches stories by the dozen. Best of all, something new is always happening or about to happen. We feel privileged to be the ones who get to chronicle it all for you.

What's the point? What's the message? There is none. But even computer magazine editors can stop and smell the roses occasionally. At least, until roses are only delivered by modem. And by that time, who knows?

Stop and look over the contents of the November issue of *Ahoy!:*

• Does you programming structure sometimes amaze your friends...for the wrong reasons? Dale Rupert will show you how to create *Amazing Structures* that amaze by virtue of their order and clarity, as this month's *Rupert Report* continues last month's investigation into arrays, lists, and linked lists. (Turn to page 20.)

• We don't know about you, but watching Ollie North testify put us in the mood to gun down a commie or two. *Desert Front* satisfied the urge for us; try it! (Turn to page 18.)

• Or, if you're one of those people who cherishes human life, Cleve Blakemore's *Orbit* lets you blast away without killing people, or even aliens—just fragments of an asteroid nearing a deadly collision with the Earth. (Turn to page 16.)

• But if the very act of shooting is what turns you off, you can battle the elements instead in Tony Brantner's *Flash Flood.* If the threat of a waterlogged basement doesn't strike you as momentous enough for a computer game, wait until you're a homeowner and have invested in deep-pile carpeting. (Turn to page 59.)

• Not since Michael Jackson swept the '84 Grammies has a creative talent achieved a tour de force such as Buck Childress has in this issue of *Ahoy!* Not the usual one or two, but all three of this month's utility programs are by the Buckster. *RAMCO,* for the C-64, C-128, 1541, and 1571 in any combination, will test five of the drive's RAM buffers for trouble. (Turn to page 46.) *A-Maze-Ing,* also in C-64 and C-128 versions, generates mazes for use in your original programs. (Turn to page 60.) And *Line Sentry* guards your program lines from inadvertent destruction. (Turn to page 50.)

• Last month, Bob Blackmer brought you into the real world with *Spray-Cam.* This month he busts you down to a *Paper Route,* where the object is to complete your rounds while generating as few complaints as possible. (As opposed to real newspaper delivery, where the goal is to land the paper on the part of the stoop where the customer can't reach it without stepping completely outside.) (Turn to page 48.)

• Our thanks to Morton Kevelson and his lovely wife Anne, whose vacation plans were altered slightly by his writing this month's *Memory Dumpers Revisited* during his week off. When it came down to meeting our deadline or making his plane, Morton put duty before pleasure, and never complained. (Well, maybe once or twice...about how the chains slowed down his typing....) (Turn to page 63.)

As always, there's more in this month's issue than we have room to describe on this page. But you're under no such constraints. Write us a nice long letter about what you like and don't like in this issue. *—David Allikas*

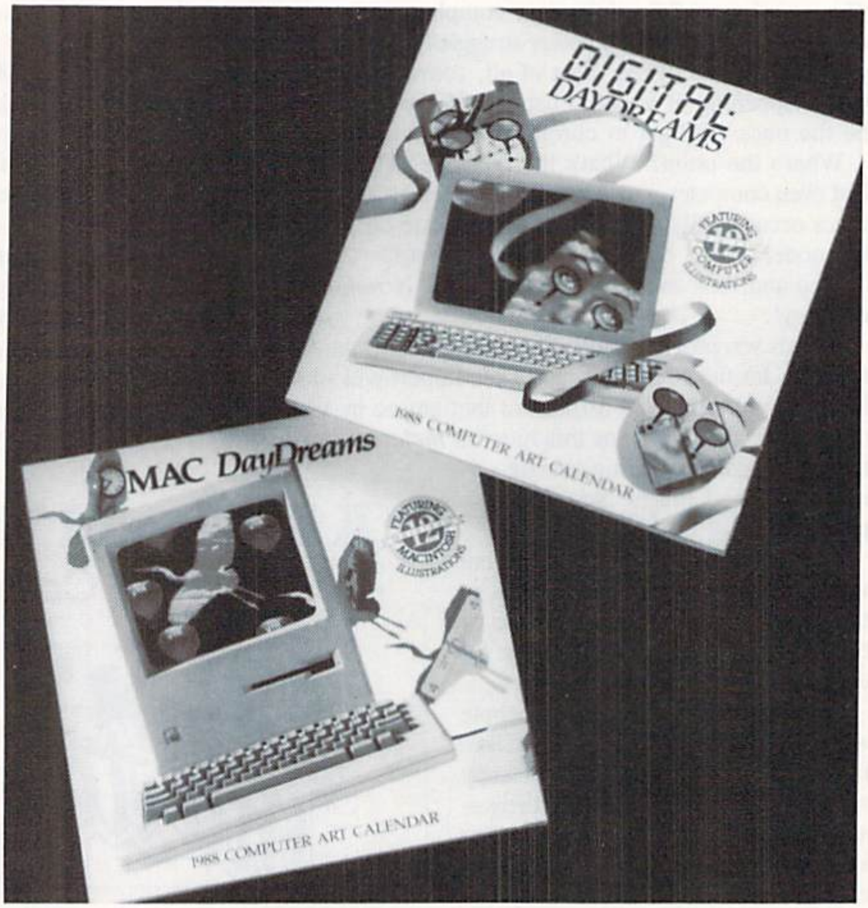
# SCUTTLEBUTT

## 3-D DRAWING • GEOS DEVELOPMENT • MIDI CONVENTION • EPSON BUFFER • CP/M DISKS • MOUSE CLEANER • GAMES FROM COSMI, ARTWORX, INFOCOM • 2400 BAUD MODEM • VIDEO CONTEST • PRINTER TUTORIALS • CALENDARS • GREETING CARDS • PRICE REDUCTIONS

### COMPUTER CALENDARS

The Digital Daydreams and MacDaydreams 1988 calendars feature computer generated graphic art on every page (the former from several computers including the Amiga, the latter from the Mac II), computer trivia, and computer hints. Price is $10.95 each, plus tax for CA residents.

Publishing Ink., 818-500-7857 (see address list, page 14).




*Along with graphics, MacDaydreams and Digital Daydreams feature computer trivia, step-saving hints, and artist profiles.* READER SERVICE NO. 103

### GAMES

From Cosmi for the C-64, priced at $24.95 each:

*Shirley Muldowney's Top Fuel Challenge* lets the player compete in a professional top fuel eliminator drag racing simulation against the three-time world champion.

*Chernobyl* puts a nuclear power reactor under control of the player's computer and charges him with the mission of averting disaster.

*Steve Garvey vs Jose Canseco in Grand Slam Baseball* lets you indulge in our national pasttime with hi-res graphics, sound effects, and scrolling TV-like screens. Additionally, Cosmi has reduced the list price of its *Super Huey* helicopter flight simulator to $12.95.

Cosmi, 213-835-9687 (see address list, page 14).

Assuming that you can deal with the anachronism, *Cycleknight* ($19.95) will plunge you, astride a high tech motorcycle, into a medieval world of magic, mystery, and danger. In search of your kidnapped Queen and her villagers, you'll enter a castle of over 2000 chambers where you'll rev engines one on one with the infamous Black Knight and barter with strange creatures. The C-64 game features five skill levels, 1-4 player operation, and the ability to generate your own castles.

Artworx, 800-828-6573 (see address list, page 14).

Elkon Enterprises, publishers of two Bard's Tale Hint Books (not to be confused with Electronic Arts' own books), has released Hint Packs for *The Pawn, Leather Goddesses of Phobos, Space Quest, Uninvited,* and the *King's Quest Trilogy.* The paks, written in story format, are priced at $5.50 each.

Elkon Enterprises (see address list, page 14).

Two from Infocom:

As the heroine of *Plundered Hearts,* sailing the 17th century seas toward your ailing father, you'll have to overcome pirates, explosives, rocky reefs, a crocodile, and your passion for Nicholas Jamison, the handsome pirate captain. $34.95 for the C-64; $39.95 for the C-128.

*Beyond Zork* finds the Kingdom of Quendor in disarray. The wizards have disappeared, the Enchanter's Guild Hall lies in ruins, drunk men utter strange tales, and monsters haunt the streets of desserted villages. You, a lowly peasant, must unravel the meaning behind all this. $34.95 for the C-128; $39.95 for the Amiga.

Infocom, Inc., 617-492-6000 (see address list, page 14).

*RSVP* ($29.95) lets C-64 users test

# VSI BANK CARDS SAME AS CASH

## WHAT AB SWITCHES DO

AB switches allow the user to share equipment rather than buy costly duplication. Many configurations may be arranged, two computers to one disk drive and printer, or two printers to one computer etc.. In our office we share a printer between a PC clone and a C128 via a parallel switch. No need to ever plug and unplug cables again, just turn a knob to swich from one peripheral to another. Below are the types we have in stock, remember if you need extra cables, we carry a large selection to meet your needs.

**$ SAVER AB — $29.95**
VIC-20, C16, Plus 4, C-64, OR C128 compatible. Three female 6 pin sockets, rotary switch, all metal case.

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**PARALLEL or SERIAL ABCD — NOW ONLY $39.95**
All pins switched. Has five female sockets, all gold pins, guarantees positive contact, rotary switch, all metal case. Parallel = 36 pins, serial = 25 pins.

**PARALLEL CROSSOVER Aa X Bb — NEW $44.95**
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## CABLES

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|---|---|---|
| Drive/printer, 6 ft. 6 pin male/male | B66 | $ 5.95 |
| Drive/printer, 9 ft. 6 pin male/male | B69 | $ 7.95 |
| Drive/printer, 18 ft. 6 pin male/male | B618 | $12.95 |
| Driver/printer, 6 ft. 6 pin male/fem. | A66 | $ 5.95 |
| Monitor, 6 ft. 5 pin to 4 RCA plugs | M654 | $ 6.95 |
| Monitor, 6 ft. 5 pin to 2 RCA plugs | M652 | $ 4.95 |
| Monitor ext., 6 ft. 5 pin male/female | ME65 | $ 5.95 |
| Joystick extension 12 ft. male/fem. | JS12 | $ 4.95 |
| Joystick Y, increase, 1 fem./2 male | JSY | $ 7.95 |
| Joystick Y, reducer, 1 male/2 fem. | RJSY | $ 3.95 |
| Power disk/print male/right ang. male | PR6 | $ 6.95 |
| Parallel, 6 ft., male to male | C6MM | $ 9.95 |
| Parallel, 10 ft., male to male | C10MM | $12.95 |
| Parallel, 20 ft., male to male | C20MM | $19.95 |
| Parallel, 6 ft., male to female | C6MF | $12.95 |
| Parallel, 10 ft., male to female | C10MF | $16.95 |
| Serial, 6 ft., male to male | R6MM | $ 9.95 |
| Serial, 6 ft., male to female | R6MF | $ 9.95 |
| IBM printer, 6 ft., male/male | IBP6 | $ 8.95 |
| IBM printer, 10 ft., male/male | IBP10 | $12.95 |
| IBM printer, 20 ft., male/male | IBP20 | $19.95 |
| Gender change, parallel, male/male | CGMM | $ 9.95 |
| Gender change, parallel, fem./fem. | CGFF | $ 9.95 |
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**SHIPPING:** Add $3.00 per order, power supplies $4.00, power center $5.00. $3.00 service charge on all COD orders (no personal checks). Foreign orders twice U.S. shipping charges. All payment must be in U.S. funds.

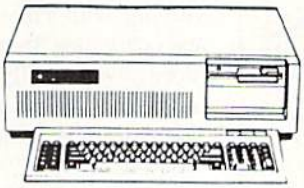
**TERMS:** All in stock items shipped within 48 hours of order. No sales tax or surcharge for credit cards. We cannot guarantee compatibility. All sales are final. Defective items replaced or repaired at our discretion. Return authorization required. Prices and items subject to change without notice.

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## DUST COVERS

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| C64/VIC20 or 1541 drive, anti static | | $ 5.95 |
| Buy one of ea. SAVE $1.41 | C64 set | $10.49 |
| C128 or 1571 drive, anti static | | $ 7.95 |
| Buy one of ea. SAVE $1.41 | C128 | $14.49 |

**PRINTER BUFFER** 64K — parallel $69.95

## POWER SUPPLIES

MAXTRON C-64, dependable heavy duty replacement. Output: 5V DC, 1.7A, 9V AC, 1.0A. UL Approved. 90 day warranty — $29.95

PHOENIX C-64, fused, repairable, all metal case. Output: 5V DC, 1.7A, 10V AC, 1.0A. UL approved. 1 year warranty — $39.95

PHOENIX C-128, fused, repairable, all metal case, 3 sockets, spike protection, EMI RFI filtering, lighted switch. Output: 5V DC, 6.0A, 10V AC, 2.0A. UL approved. 1 year warranty — $59.95

## COOLING FAN — $29.95



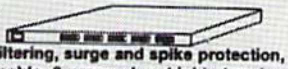
Heat is a #1 enemy to your disk drive. Reduce bad loads and costly repair bills with a fan, keep your 1541 or 1571 cool. Quiet, surge and spike protection, EMI filtering

## JOYSTICKS

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| Slik Stik | $ 6.95 |
| Puts Stik | $ 7.95 |
| WICO Black Max | $11.95 |
| TAC 5 | $14.95 |
| EPYX 500XJ | $15.95 |

## POWER CENTER — WAS $59.95 — NEW LOW PRICE $49.95

The POWER CENTER provides individual control of up to 5 components plus master on or off switch.



System protection: EMI/RFI filtering, surge and spike protection, 15 AMP breaker, heavy duty cable, 3 prong plug. Lighted rocker switches, all steel case, size: 1 3/4 H x 12 1/4 D x 15 W.

## INKWELL SYSTEMS

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| Flexidraw | $84.95 |
| Flexifont | $24.95 |
| Graphics Int. II | $24.95 |
| Clip Art II | $19.95 |
| Holiday Theme | $19.95 |

## INTERFACES

MODEM RS-232 INTERFACE, $29.95
Use standard Hayes compatible RS-232 modems with VIC-20, C-64, C-128.

DELUX RS232C INT., Omnitronix $39.95
Use standard RS-232 equipment with the C64, C128, C64, SX64, VIC20

| | |
|---|---|
| HOT SHOT, printer | $49.95 |
| Cardco G-WIZ printer | $39.95 |
| Cardco Super G printer | $49.95 |
| PPI printer interface | $44.95 |
| XETEC Super Graphics printer | $54.95 |
| XETEC Super Graphics Jr. printer | $34.95 |

## APROSPAND 64 — $29.95



plugs into the cartridge port, has 4 switchable slots, fuse protected and a reset button.

## 12 PLUS — $19.95

12 in. cartridge port extension cable. Move boards and cartridges to the side of your computer. In stock.

## JOYSTICK REDUCER — $3.95

Every once in a while, our buyers find one of those odd gadgets they just can't resist. The Joy Stick Reducer is odd and low-priced. It allows one joystick to be plugged into both ports at the same time. I know you are saying, what's it good for. Stop and think, how many times have you had to try both ports before finding the right one?

## "THE STRIPPER" — $14.95

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The "Stripper" removes perforated edges from print-outs. Insert 1 to 20 sheets, presto edges are gone. Clean, quick



## MODEMS, 1200 Baud

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| Aprotek 12C, C64, C128, compatible | $ 99.95 |
| Aprotek 12AM, AMIGA compatible | $119.95 |
| Avatex 1200 | $ 99.95 |
| Avatex 1200HC, Hayes compatible | $119.95 |

## 40/80 COL. CABLE — $19.95

One cable for both 40 or 80 columns on the C128. Flip a switch to change modes. Plugs to the back of the monitor for a sharp display. 16 colors in 40 column, black and white in 80. Not for RGB monitors or television sets.

## DISK DOUBLER — $6.95

The original! All metal Cuts an exact square notch in the disk. Same spot every time!



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## BLASTER C64, C128 — $5.95

Add automatic firepower to your games, plug-in module that makes the fire button of your joystick have machine gun action. Adjustable speed control.

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| JASCO heavy duty wire printer stand | $12.95 |
| PC CPU stand, adjustable, plastic | $14.95 |
| Monitor, adjustable tilt and swivel stand | $14.95 |

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| GEO Mouse by Berkley C64/C128 | $49.95 |
| Logitech Mouse C-7 (PC compatible) | $89.95 |
| Optical Mouse (Microsoft PC compatible) | $79.95 |
| American Mouse House | $ 6.95 |
| American Mouse Mat | $ 7.95 |
| Light Pen by Tech Sketch C64/C128 | $44.95 |
| Touch Point Graphics Tablet C64/C128 | $29.95 |

## BLACK BOOK of C128 — $15.95




The best friend a C128 user ever had . . . Includes C-64, C128, CPM, 1541, 1571. 261 pages of easy to find information. 75 easy to read charts and tables. The Black Book of C128 is very much like a dictionary, always ready to answer your questions.

## PROTECTION REVEALED C 64 — $15.95

A beginners guide to software protection. Written to give you a fundamental understanding of a disk and BASIC protection. Identify what you are seeing when examining a disk. Become a master of illusion. Reveals countless tricks and tips that mystify the user. The book is 141 pages and includes a free disk of 21 utility programs.

## SAM's BOOKS

| | |
|---|---|
| C64 Troubleshooting & Repair Guide | $19.95 |
| 1541 Troubleshooting & Repair Guide | $19.95 |
| Computer facts VIC-20 | $19.95 |
| Computer facts C-64 | $19.95 |
| Computer facts C-128 | $19.95 |
| Computer facts 1541 | $19.95 |
| Computer facts 1571 | $19.95 |

## "TOUCH ME BUTTON" — $9.95

Static can KILL your COMPUTER and your PROGRAMS. Touch Me rids your system of harmful static like MAGIC before you touch your computer peripherals or other devices. The controlled electrical resistance of Touch Me, drains static charges harmlessly away to ground at low energy levels. Touch Me can add years of life to your equipment.

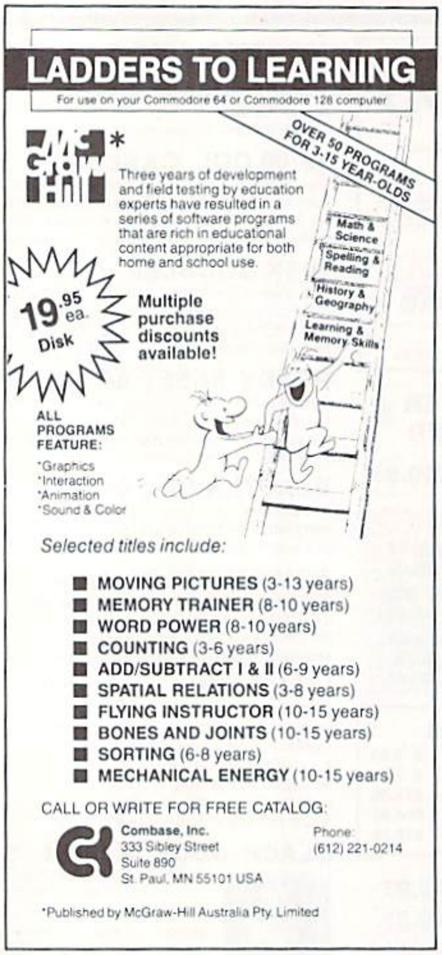
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## MISCELLANEOUS

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| CARDCO numeric keypad | $47.95 |
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| Write protect tabs, silver, 100 pack | $ 1.49 |
| Floppy wallet, 3 1/2 in., holds 15 | $ 9.95 |
| Floppy wallet, 5 1/4 in., holds 15 | $12.95 |
| Disk pages, 2 pocket, 3 hole, 10 pack | $ 6.95 |

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and expand their knowledge of manners. Players choose a career that takes them into national or international situations, then start at the bottom and work their way up through a series of interactions that require knowledge of manners and propriety. You may need to know the proper format for business letters, how not to offend your Japanese hosts, or how to handle tricky telephone situations.

Blue Lion Software, 617-876-2500 (see address list, page 14).

RSA has released two three-game disks for the Plus/4 and C-16. *Adventure Pack I* contains *Jack and the Beanstalk, Computer Adventure,* and *Moon Base Alpha. Adventure Pack II* has *African Escape, Hospital Adventure,* and *Bomb Threat.* $9.95 each, plus $1.50 postage per order. A free catalog is available.

RSA (see address list, page 14).

From Star Soft International comes *The Pirates of the Barbary Coast* ($16.99), plus a selection of triple packs starting at $7.99.

Star Soft International, 516-228-8210 (see address list, page 14).

Mindscape will publish C-64 versions of several Atari arcade games, beginning with *Paperboy* and *Gauntlet* and continuing "over the next few years" (does anyone really plan that far ahead in this business?) with *Road Runner, Road Blasters, Gauntlet II,* and *725.*

Mindscape, 312-480-7667 (see address list, page 14).

Electronic Arts will henceforth be distributing Datasoft's *221B Baker Street* and *Alternate Reality: The Dungeon,* Game Designers' Workshops' *Road to Moscow,* and Strategic Studies Group's *Battles in Normandy, June-July 1944.*

And bringing them still another step closer to their goal of acquiring all the computer game manufacturers that haven't already been acquired by Activision, Electronic Arts has also become the exclusive distributor of First Byte software. Six educational programs for the Amiga will be made available:

*First Square* teaches shape names and the difference between smaller and larger to children 3-8.

*Smoothtalker* converts English text in male or female speech.

*KidTalk* is a word processor for children aged 5-10.

*MathTalk* utilizes a drill and practice system that can be tailored to the child's lessons in school.

*Speller Bee* incorporates games of Scramble, Search, and Detective into the child's play to reinforce spelling rules.

Watch these pages. One of these months we'll be reporting on the fact that Electronic Arts and Activision have bought each other.

Electronic Arts, 415-571-7171 (see address list, page 14).

Broderbund's new line of Value Priced Software, consisting of selected titles at reductions of 50% or more, includes *Lode Runner, Karateka,* and *Choplifter!/David's Midnight Magic* at $14.95.

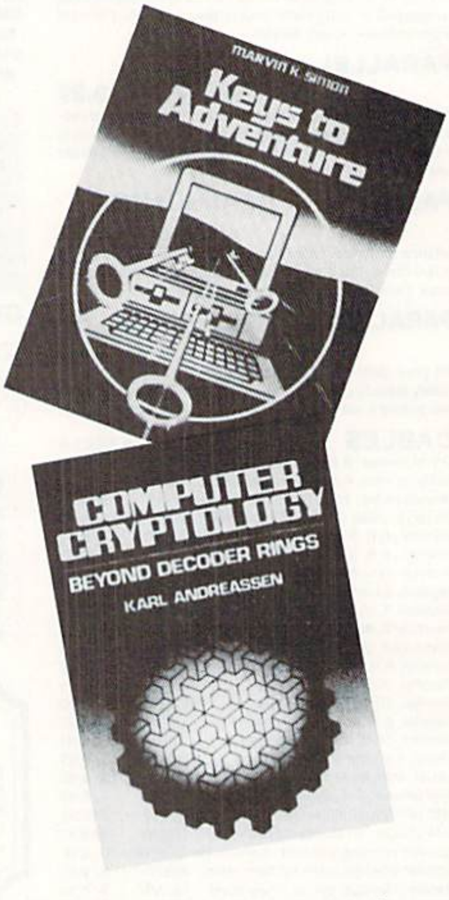
Broderbund Software, 415-479-1700 (see address list, page 14).

## BOOKS

Two from Abacus:

*Amiga for Beginners* ($16.95) introduces the new user to Intuition, the mouse, the CLI, and AmigaBASIC.

*Amiga Machine Language* ($19.95) describes the 68000 processor, address modes, and instruction set. The reader is taught to access the computer's memory, operating system, and multitasking capabilities. Information is also provided on the Amiga libraries for using AmigaDOS, Intuition, and the computer's speech and sound facilities from machine language.




***Deciphering games, encrypting data.***
***READER SERVICE NO. 104***

Abacus, 616-241-5510 (see address list, page 14).

*Chip Talk: Projects in Speech Synthesis* ($14.95 paperback, $24.95 hardcover) supplies step by step instructions for building seven speech synthesizers, each based on a different IC. Programs are provided for interfacing the projects with the C-64/128, as well as with other micros. An introduction to the principles of speech and speech synthesis is included.

TAB Books Inc., 717-794-2191 (see address list, page 14).

Two Prentice Hall paperbacks:

*Keys to Solving Computer Adventure Games* ($19.95) provides clues and tips specific to such C-64 and Amiga text and graphic adventures as *Trinity*, *Ballyhoo*, and *The Black Cauldron*.

*Computer Cryptology: Beyond Decoder Rings* ($21.95) advises users of C-64s and other microcomputers on methods of disguising data through encryption and enciphering so that only authorized deciphering can recover the original information. The author demonstrates computer creation of tables and derivations essential to speedy cryptogram use, with over 30 programs fully listed.

Prentice Hall, 201-592-2427 (see address list, page 14).

### VIDEO CONTEST

Aegis has extended the deadline for their Desktop Video Contest to October 10, 1987. So you still have a few days to create a short (under five minute) "movie" on your Amiga, in ½" or 8mm format, using at least one Aegis product. Prizes range from $1000 for first place to $100 for honorable mentions. More details can be obtained at your Amiga dealer, or by calling Aegis directly.

Aegis Development, Inc., 213-392-9972 (see address list, page 14).

### MICROPROSE CHANGE

We're giving you plenty of notice, so don't come crying to us next summer when you can't find MicroProse games at your local software dealer. As a result of a lawsuit filed by and won by MicroPro International, MicroProse will undergo a name change by June 16, 1988. Products released before that date may continue to carry the MicroProse name until June 16, 1991.

No new name has been decided on, though President Bill Stealey says the company is currently considering "hundreds" and will soon begin narrowing down the choices. If you have any ideas, we're sure MicroProse would love to hear them.

MicroProse, 301-771-1151 (see address list, page 14).

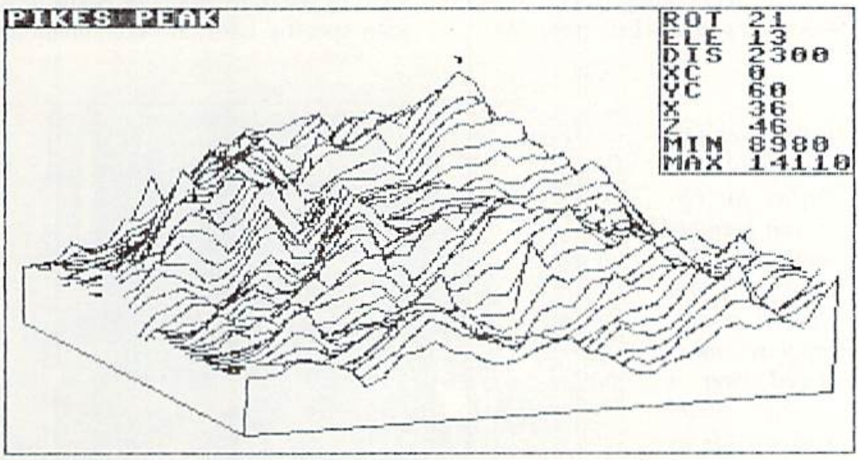
### 3-D DRAWING

*3D Surface* ($39.95) lets the 64 user graph topographic maps, spatial frequency and distribution, subsurface geology, open pit mines, building sites, and logos, all in three dimensions. It is possible to rotate a graph 360 degrees, and move the elevation from +10 to +80 degrees. Other parameters that can be adjusted are scale (apparent viewing distance), grid size, printer output size, and center of graph. All graphs can be compressed or expanded horizontally or vertically. Vertical and horizontal cross-sections can be printed or saved.

Digiscape Software, 214-241-9891 (see address list, page 14).

### GEOS DEVELOPMENT

*geoProgrammer* ($69.95) facilitates the development of application software for use with GEOS. Intended for programmers with a solid understanding




**3D Surface:** *for graphically modeling and rotating 3-D topographic maps, building sites, logos, and more.* *READER SERVICE NO. 137*

of 6502 assembly language, the program utilizes Berkeley's *geoWrite* as the editor for its assembler. Three main functions are supported:

• geoAssembler reads source text from geoWrite documents. It supports 6502 assembly mnemonics and addressing modes, and permits the defining of over 1000 labels for each assembly module.

• geoLinker accepts link structure from the geoWrite document and reads relocatable object modules produced by geoAssembler. It also supports construction of GEOS SEQ type and VLIR (module swapping) applications, and cross-references and evaluates unresolved arithmetic and logical expressions passed from the assembler.

• geoDebugger transforms the RAM Expansion Unit into a monitor so applications using maximum available memory can be debugged. Memory examination and modification commands are also provided, including symbolic line-disassembly and a line assembler for patching codes.

Berkeley Softworks, 415-644-0883 (see address list, page 14).

### EPSON BUFFER

A print buffer from Image Technology mounts inside most Epson dot matrix parallel printers to allow you to store print jobs in your printer and get back to work while the printer operates at its own pace. One board can provide anywhere from 0K (you provide the RAM chips) for $109 to 512K for $157.

Image Technology, Inc., 303-799-6433 (see address list, page 14).

### MIDI CONVENTION

Midi Expo, a digital music forum and marketplace, will be held December 5 and 6 at the New York Hilton. The event is built around an educational program of seminars and workshops on the interface of music and computer technology. In addition, a complete range of products, equipment, systems, and services will be showcased.

Expocon Management Associates, 203-259-5734 (see address list, page 14).

### CP/M DISKS

INCA has made available 15 double-sided disks full of public domain CP/M programs, ranging from "golden oldies" to recent additions to the CP/M community. Each $9.95 disk contains at least 250K and can be ordered in 1541 or 1571 format. A free catalog is available.

INCA, 619-224-1177 (see address list, page 14).

### MORE REDUCTIONS

In addition to the games mentioned elsewhere in this month's *Scuttlebutt,* Broderbund has lowered the price of its *Thinking Cap* outline processor to $34.95, *Bank Street Mailer* and *Speller* at $24.95, and *Filer* at $29.95.

Broderbund Software, 415-479-1700 (see address list, page 14).

### PRINTER POINTERS

A line of book(let)s and software dealing with printer control for the C-64, C-128, and Plus/4 is being offered by McWare products. Some deal with specific hardware combinations

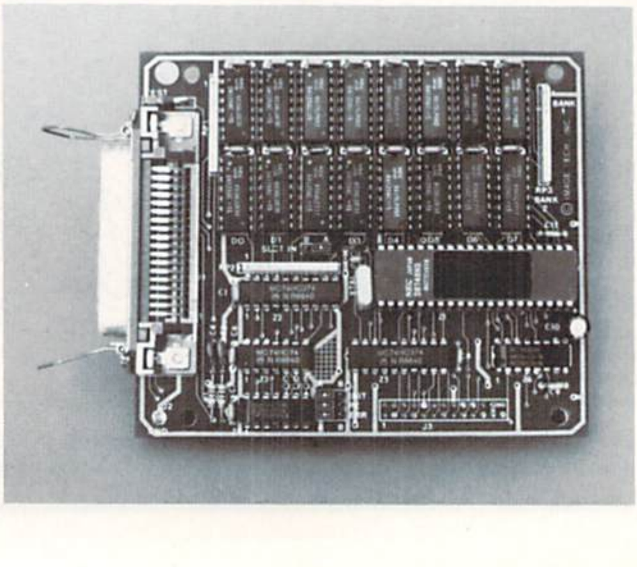


*Image Technology's internal buffer for Epson printers works like Epson's own, but has a greater capacity and is priced lower. A single board can provide as much as 512K. READER SERVICE NO. 105*




*The Okitel 2400 can be programmed with a delay that bypasses spurious line interruptions like call waiting signals.* *READER SERVICE NO. 106*



(such as the Plus/4 with Micrographix interface); others offer more general guidelines. Prices range from $9.95 to $49.95. A catalog is available.

McWare Products, 703-664-3433 (see address list, page 14).

### GREETING CARD MAKER

Classic Compu has added "Season's Greetings" and "Merry Christmas" collections to their line of tractor-feed greeting cards in fan-fold form. Messages can be added to any of the illustrated cards. Each 50 card, 40 envelope collection will retail for $9.95.

Classic Compu, 201-579-3369 (see address list, page 14).

### 2400 BPS MODEM

A 2400 baud modem that can be used with the Amiga, the Okitel 2400 ($599) features automatic adaptive equalization and automatic disconnect. Its two modular phone plugs make it possible to hold a conversation on the phone and subsequently transmit data through the telephone outlet. Included is the Okitel II communications software, a custom version of Lindbergh's Omniterm, as well as an offer for free connect time and discounts worth up to $150 on CompuServe or discounts on Dow Jones.

Okidata, 609-235-2600 (see address list below).

### LADDERS TO LEARNING

In keeping with the western world's current fascination with things Australian, Combase will distribute the Ladders to Learning series originally published down under by McGraw Hill. The series consists of over 50 programs for 3 to 15 year olds in the categories of Math and Science, Spelling and Reading, History and Geography, and Learning and Memory Skills. Price of each C-64 title is $19.95.

Combase, Inc., 800-328-6795 (see address list below).

### KEEP IT CLEAN

Mouse Cleaner 360° ($16.95) cleans the tracking rollers inside the mouse to eliminate jerky movement and slow response. Solution is applied to a ball that's loaded into the mouse and rotated over a board of cleaning bristles.

Ergotron, Inc., 612-854-9116 (see address list below).



*The Mouse Cleaner 360° kit includes scrubber ball, scrubber board, lint-free chamois cloth, and cleaning solution.* *READER SERVICE NO. 107*



### Companies Mentioned in *Scuttlebutt*

**Abacus**
2201 Kalamazoo S.E.
Grand Rapids, MI 49510
Phone: 616-241-5510

**Aegis Development, Inc.**
2210 Wilshire Blvd., #576
Santa Monica, CA 90403

**Artworx Software**
1844 Penfield Road
Penfield, NY 14526
Phone: 716-385-6120

**Berkeley Softworks**
2150 Shattuck Avenue
Berkeley, CA 94704
Phone: 415-644-0883

**Blue Lion Software**
P.O. Box 650
Belmont, MA 02178
Phone: 617-876-2500

**Broderbund Software**
17 Paul Drive
San Rafael, CA 94903
Phone: 415-479-1170

**Classic Compu**
122 Main Street
Newton, NJ 07860
Phone: 201-579-3369

**Combase, Inc.**
333 Sibley St.—Ste. 890
St. Paul, MN 55101
Phone: 612-221-0214

**Cosmi**
415 North Figueroa Street
Wilmington, CA 90744
Phone: 213-835-9687

**Digiscape**
P.O. Box 113058
Carrollton, TX 75011
Phone: 214-241-9891

**Electronic Arts**
1820 Gateway Drive
San Mateo, CA 94404
Phone: 415-571-7171

**Elkon Enterprises**
2914 Pennsylvania
Wichita Falls, TX

**Ergotron Inc.**
1621 E. 79th Street
Bloomington, MN 55420
Phone: 612-854-9116

**Expocon Management**
3695 Post Road
Southport, CT 06490
Phone: 203-259-5734

**Image Technology, Inc.**
8150 S. Akron Street
Englewood, CO 80112
Phone: 303-799-6433

**INCA**
1249 Downing Street
P.O. Box 789
Imperial Beach, CA
Phone: 619-224-1177

**Infocom, Inc.**
125 CambridgePark Drive
Cambridge, MA 02140
Phone: 617-492-6000

**McWare Products**
P.O. Box 2784
Fairfax, VA 22031
Phone: 703-664-3433

**MicroProse**
120 Lakefront Drive
Hunt Valley, MD 21030
Phone: 301-771-1151

**Mindscape, Inc.**
3444 Dundee Road
Northbrook, IL 60062
Phone: 312-480-7667

**Okidata**
532 Fellowship Road
Mt. Laurel, NJ 08054
Phone: 609-235-2600

**Prentice Hall**
Englewood Cliffs,
NJ 07632

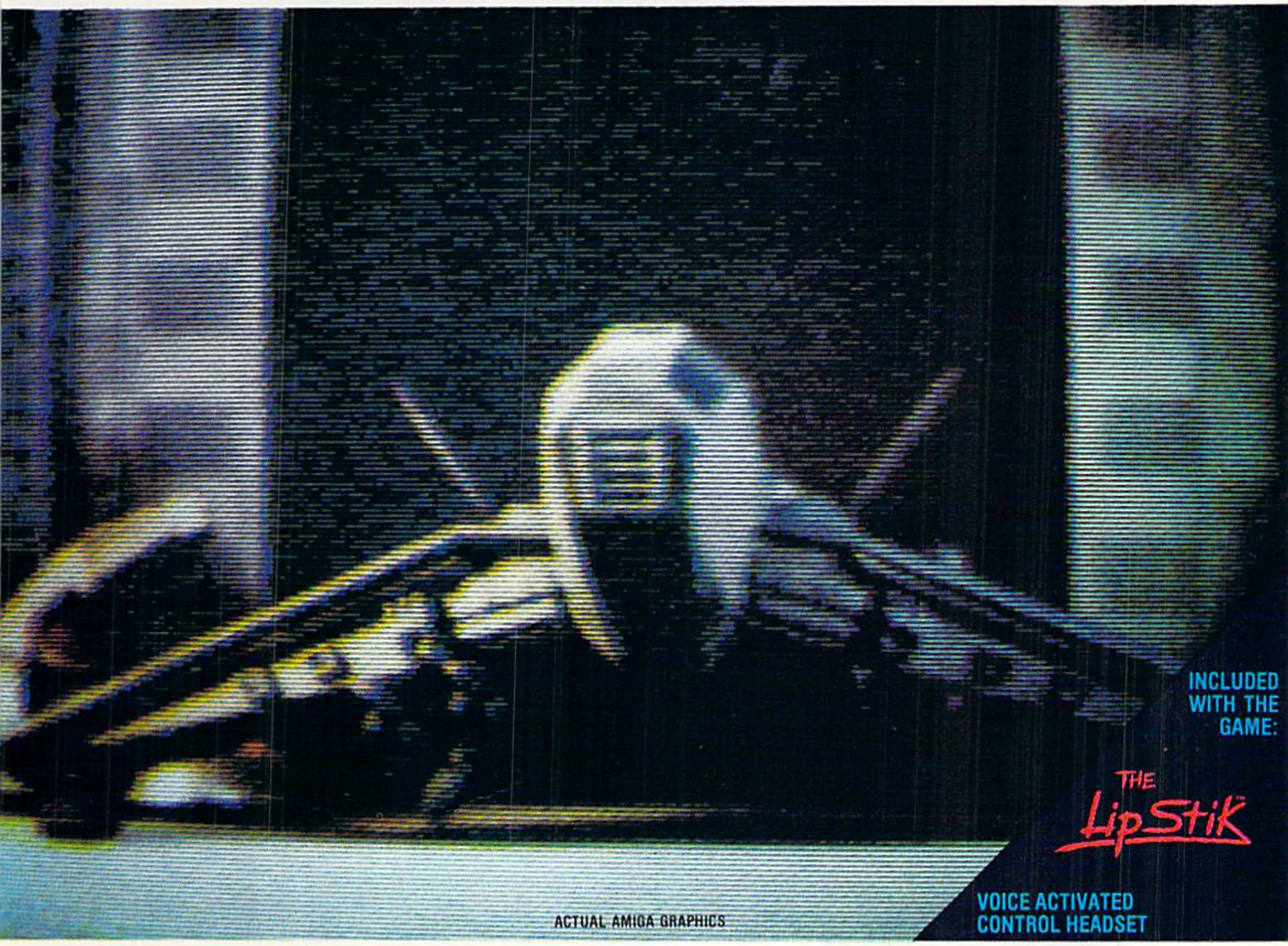
**Publishing Ink.**
521 State Street
Glendale, CA 91203
Phone: 818-500-7857

**Robinson Software**
32 Knock Knoll Circle
Willow Grove, PA 19090

**Star Soft International**
50 Charles Lindbergh Bd.
Uniondale, NY 11553
Phone: 516-228-8210

**TAB Books Inc.**
P.O. Box 40
Blue Ridge Summit,
PA 17214
Phone: 717-794-2191

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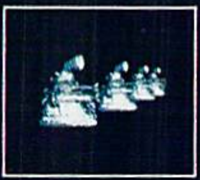
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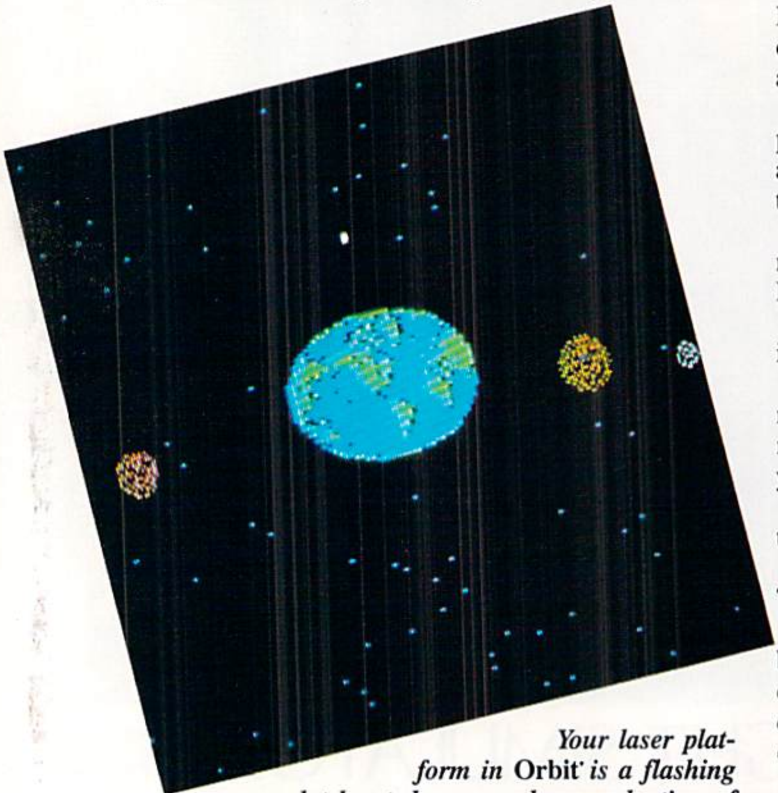


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ACCESS SOFTWARE, INC. 2561 So. 1560 W. Woods Cross, UT 84087




Careless experimentation with the newly operational SDI weaponry in space has fractured a major asteroid close to the Earth!

The stray pieces have fallen toward Terra after being captured in our gravitational field. Now the Earth's greatest scientists have joined forces to construct a massive particle beam weapon at Cape Kennedy in Florida.



*Your laser platform in* **Orbit** *is a flashing dot located on a scale reproduction of the Earth. You fire through an orbiting satellite mirror.*

You are the weapon's controller. Using your precise knowledge of trajectory and velocity, you must shoot down all three chunks of orbiting space debris before they collide with our planet's surface, killing thousands!

An orbiting satellite dish in space is the objective lens for the particle beam weapon on the surface. Your beam travels in a line from the ground into the atmosphere through the dish.

There are three different chunks, with the larger ones closest and the smaller rocks farther out. The tiniest asteroid is very difficult to hit.

Only you can prevent Earth from ending up as the largest piece of swiss cheese in the Galaxy.

I sort of created this game in a fit of nostalgic whimsy.

If you ever had a copy of David Ahl's *Basic Computer Games,* you probably have played a text version of *Orbit* many, many times.

I can remember my first computer, a Tandy MC-10. This little whiz had color graphics, sound effects, and a nice BASIC subset which seemed enormously lavish at the time. I spent many happy hours playing the text version of *Orbit* on that micro, shooting at the Romulan craft while it glided around the Earth.

When I tired of the simple text game, one of my first projects was to create a graphic version of it. That game alone taught me hi-res plotting, geometry, and animation tricks.

The MC-10 is long dead and buried, but I couldn't resist making a version for my seemingly inexhaustible C-128 in BASIC 7.0!

With the addition of sprites and the SID chip, this game is as fun as it ever was.

Your laser platform is a flashing dot located on a scale reproduction of the Earth, near Florida. A white dot represents the orbiting satellite mirror in space through which you fire the weapon at your target.

With a joystick plugged into Port 2, you push left to rotate the satellite clockwise, right for counterclockwise.

Push the fire button to activate the particle beam pulse. The beam travels slowly, so you'll need to "lead" your target.

You'll require a lot of practice to hit all three asteroids before they collide with the Earth. If even a single asteroid escapes past you and enters the atmosphere, thousands will die and real estate values will drop drastically at the site of impact.

You can only fire the weapon once per Earth revolution, so make every shot count. The satellite dish is white when it is charged, red when depleted. Use this charging time to orient the dish for your next shot.

The game is in BASIC, and is another listing of the "short and sweet" variety, like *Galactic Cab Co.* and *Wraiths* in the May '87 issue. With a little creativity and some forethought to graphic layout, it is utterly amazing what can be created with a handful of 7.0 lines. Although BASIC 7.0 can be a chore to debug sometimes, the results are worth it. I encourage you to study all three games and to feel free to borrow main loops or central routines for your own ventures on the C-128.

Giving credit where credit is due, the original text *Orbit* was designed in the 1960's at M.I.T. for the PDP-1000 mainframe. (Another late night project that made microcomputing history.) ☐

*SEE PROGRAM LISTING ON PAGE 96*

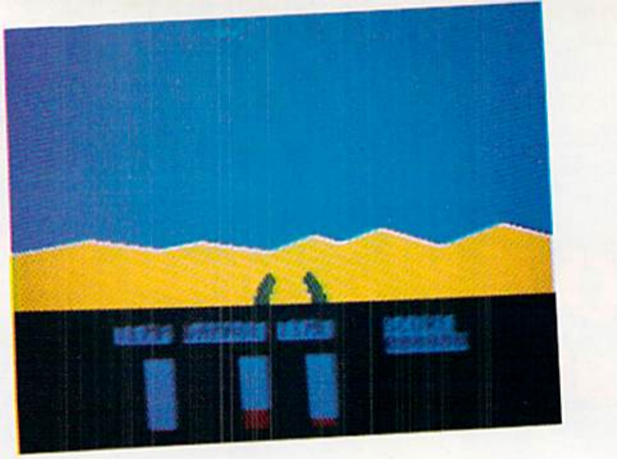
PHOTOS BY MICHAEL R. DAVILA



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Reader Service No. 292

# DESERT FRONT

## For the C-64
### By Alan Thomason



It is the year 1995 and the world is in turmoil. In a major tactical blunder, NATO field command left a passageway of the highest strategic importance inadequately fortified. Through it, the enemy could strike a crippling blow to NATO's worldwide communications center. The war could be lost in the blink of an eye...unless enemy reconnaissance never finds the pass!

You are a small outpost armed with a Marksman IV antiaircraft system. You must keep the scout planes from getting past you—the free world depends on it!

The graphics in *Desert Front* will knock you khakis off! A scrolling mountain range scenery, three dimensional movement, and fantastic sound give this game an arcadelike quality. You'll want to play it again and again.

**TYPING IT IN**

*Desert Front* is written entirely in machine language and takes up a little less than 4K. To type it in you must use *Flankspeed* (see page 95).

After you are through typing in *Desert Front*, be sure to save at least two copies. Next, LOAD"DESERT FRONT", 8,1 and SYS 49152. The title screen should appear. If not, go back and check all your numbers.

**PLAYING THE GAME**

Playing *Desert Front* is simple—all you have to know is to watch your instruments and (especially) the enemy scout. A good strategy is to trap the plane near the ground so that it can only move horizontally. You'll get points for each plane you hit and also for how much time, damage, and temperature you have left. To pause the action of the game, press the space bar. □

*SEE PROGRAM LISTING ON PAGE 100*

PHOTO: MICHAEL R. DAVILA

# CDA COMES TO EARTH

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**THE GRAPHICS TRANSFORMER – $34.95**
(C-64/C-128)
★ ★ ★ ★ ★ (Megagalactic Software Weekly)

". . . THE GRAPHICS TRANSFORMER is the greatest graphics utility since the release of OMNI-PAINT. It allows you to quickly and easily convert between ALL of the popular drawing programs (over 25 supported), and does other neato things as well. I highly recommend it to all software consumers . . ."



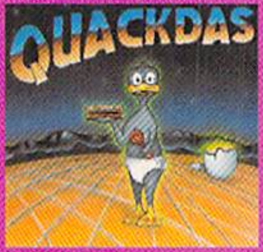

**LEXCHECK – $29.95**
(Amiga)
$ $ $ $ $ (Business Software & Galaxian Report)

". . . [LexCheck] will help you do [everything] that you need to do with your [word-processing] programs. It will [rapidly spellcheck] all of your documents [with its 100,000 word dictionary]. I would [buy two of them] if I were you . . ."




**MOVING PICTURES – $29.95**
(C-64/C-128)
★ ★ ★ ★ ★ (Transmission — The Intelligence Journal)

". . . Chris Zamara & Nick Sullivan (of Transactor Magazine, Earth) did it again with the most comprehensive animation program yet available for any silicon based unit. Unfortunately, you don't have to be intelligent to use it . . ."




**QUACKDAS – $39.95**
(C-64/C-128 mode/1541/1571 mode)
★ ★ ★ ★ ★ (Operating Systems & Intergalactic Insight)

". . . finally a cartridge that speeds up SAVE's as well as LOAD's (fast format, included FREE!). QUACKDAS comes complete and ready to use with its blinding speed, built in DOS wedge, sector editor, and a token disk copier! Definitely something to write home about . . ."




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". . . NEOFONT is the most artistic and well designed collection of fonts for the GEOS operating system. It contains over 23 different fonts, that are simply sublime. Do yourself a favor, and appreciate some REAL art . . ."




**1541 AUNTIE BUMP BOARD – $49.95**
(C1541 compatible)
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". . . it's surprising that the generic mortal *species* hadn't come up with a device to ELIMINATE the damaging knock on the 1541 disk drive before now. After looking at the circuit board, I've come to the conclusion that they did it almost as good as the Vorkons could've . . ."




**ENTROPY – $29.95**
(Amiga/C-64/C-128 compatible)
? ? ? ? ? ? ? (The Hitchhiker's Guide to Galaxian Software)

". . . an interesting implementation of an adventure game. It's hard to believe that so many abstract perversions can be contained in one place. ENTROPY is destined to become another milestone in the realm of interactive fiction . . ."



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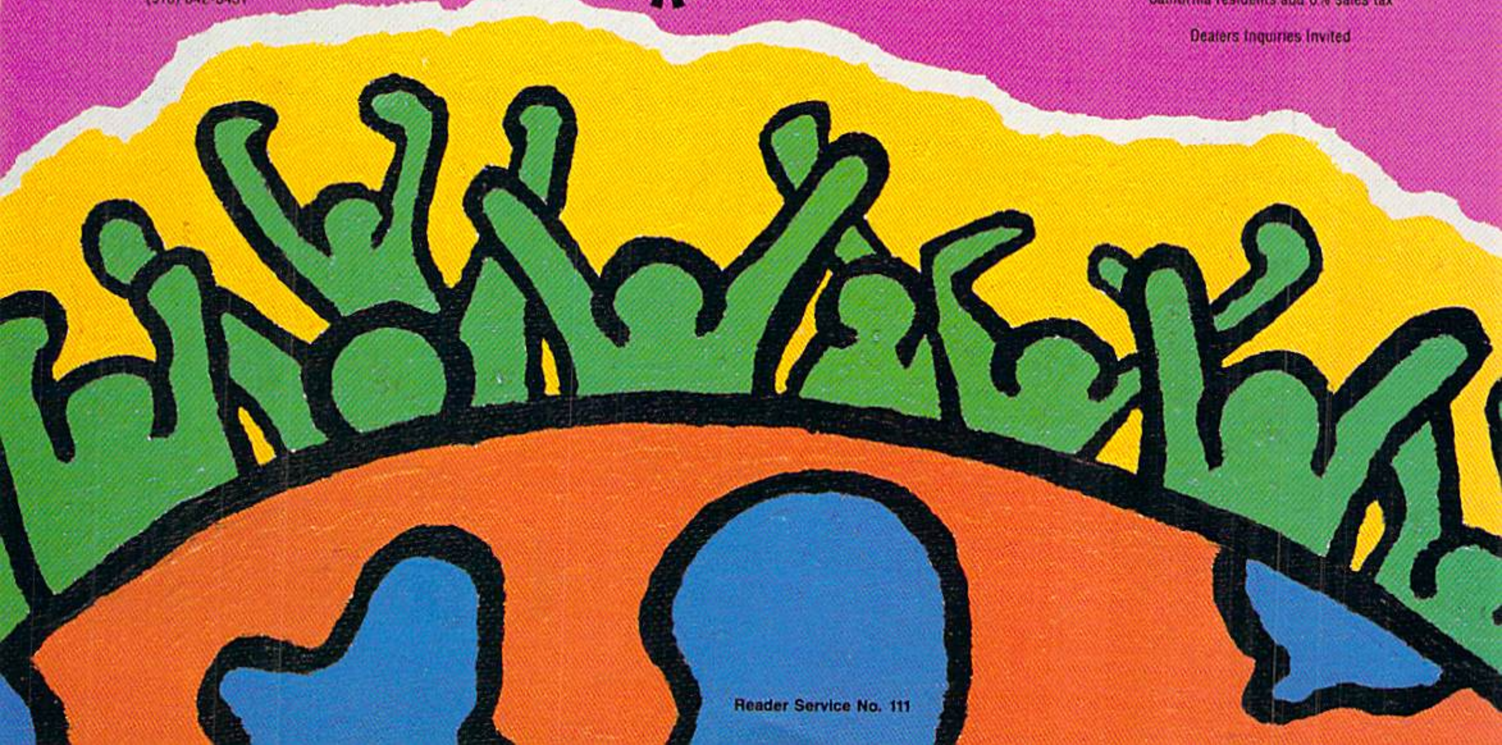
". . . what can you say about a software company that markets posters. The fabled Mandelbrot Set is now captured on paper (where available — some restrictions might apply), using the highest resolution ever experienced to date . . ."

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RUPERT REPORT

# AMAZING Structures

You are lost in a maze, a tangle of criss-crossed paths. You are going in circles because you don't know which paths you have tried and which ones are left to explore. If this describes the last computer program you wrote, perhaps you need a more appropriate data structure. We will continue last month's investigation into linked lists, and look further into the realm of exotic data structures.

The way the data in a program is organized greatly affects the ease of writing, debugging, and modifying the program. For many programs, simple numeric and string variables suffice. Frequently BASIC's only other explicit data structure, the array, can untangle a mess of program lines and help to create better programs.

Some programming languages provide a rich variety of data structures, but as we saw last month, BASIC has the flexibility to duplicate these structures. All it takes is a little ingenuity and a few examples.

This month we will see a very important example of the singly linked list. We will also look at doubly linked lists and some variations on the linked-list data structure.

**START WITH THE BASICS**

Whether or not you realize it, you are involved with linked lists every time you run a BASIC program. The BASIC language interpreter stores each program in memory as a singly linked list. By understanding this structure, we can better appreciate what's going on behind the scenes of the BASIC interpreter.

A BASIC program may be represented in graphical form, as in Diagram 1 on page 23. START is a two-byte pointer which stores the starting address of the program. This program example has three lines, each represented as a node in a linked list. Each program line node consists of four fields. The Link points to the start of the next node. Line# stores the program line number. This is followed by the Text of the program line which is terminated by a single byte of 0. The Link of the last program line points to two consecutive bytes of zero indicating the end of the program.

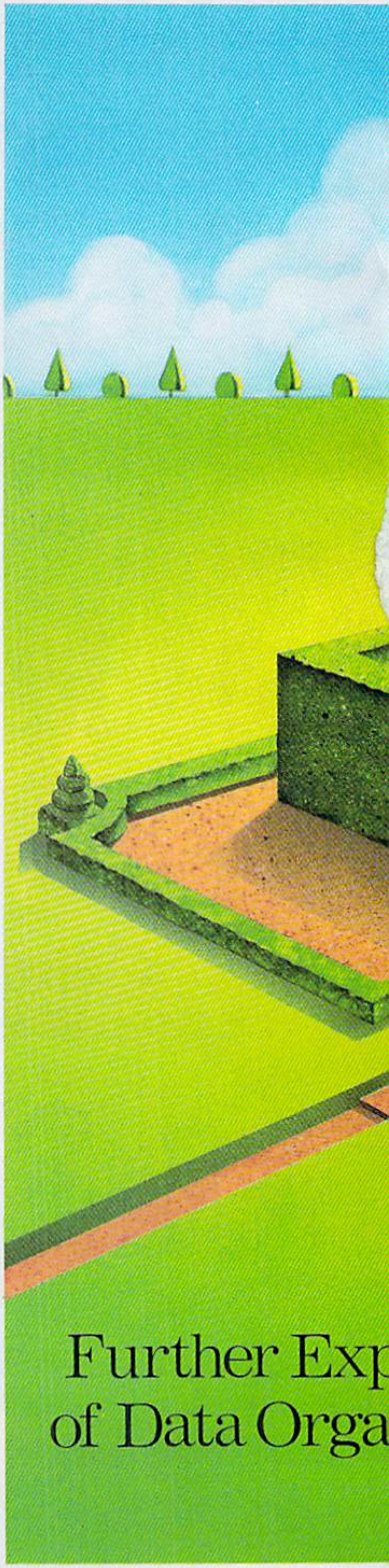
To see this structure on your computer, run the following self-investigating program:

```
10 M=PEEK(45)+256*PEEK(46)
20 FOR N=M TO M+56
30 PRINT N;PEEK(N),:NEXT
```

If you are using the C-64, change the 45 and 46 in line 10 to 43 and 44. (START from Diagram 1 is at addresses 45 and 46 on the C-128; it is at addresses 43 and 44 on the C-64.) Type this program exactly as shown with no spaces in line 10, three spaces in line 20, and one space in line 30 (disregarding the space after each line number).

When you run the program, you see 57 pairs of numbers which show how

By Dale Rupert



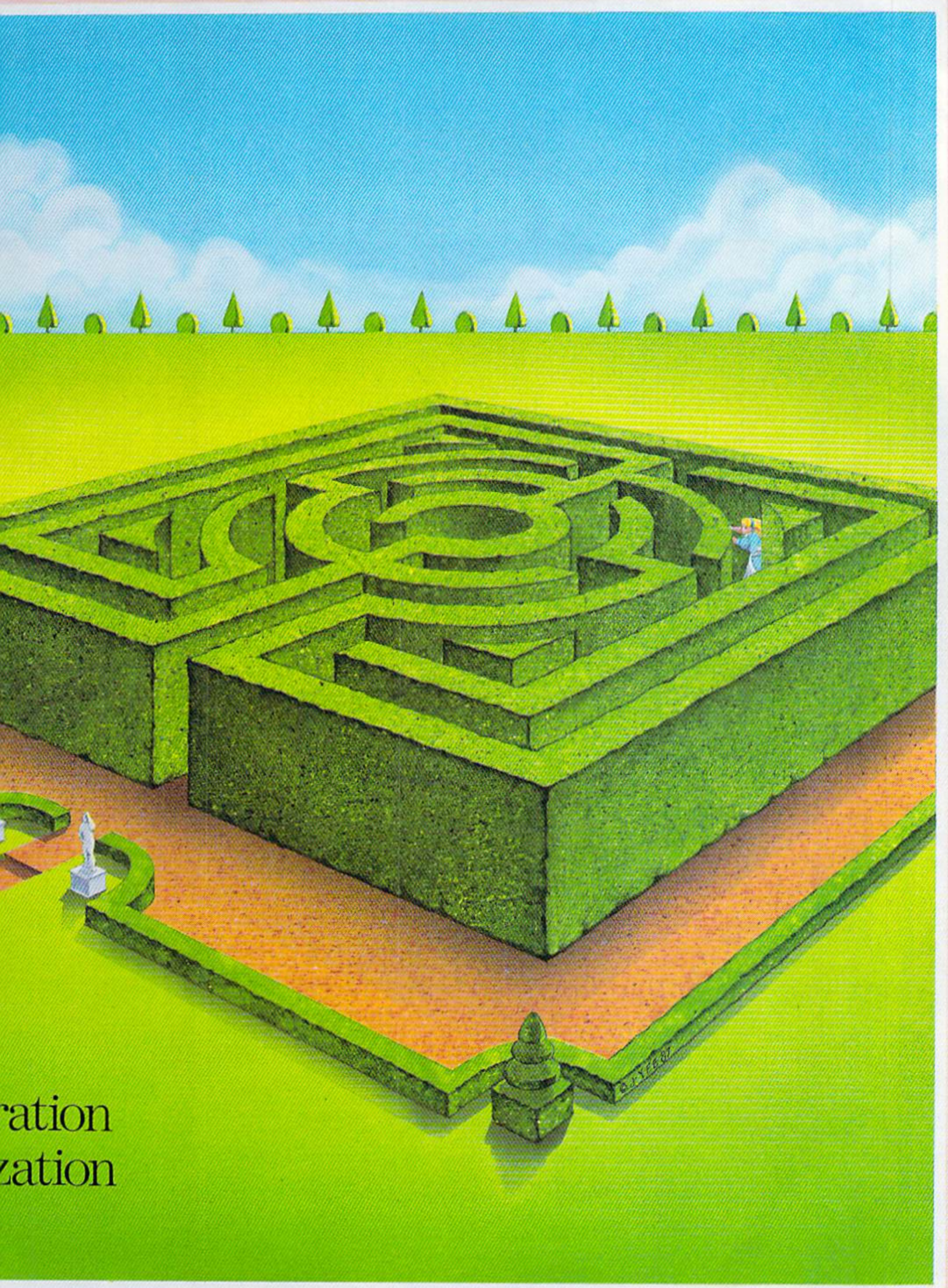



ILLUSTRATION BY JOSIE YEE


"... dramatic improvements over 1541 in quality and reliability ... while keeping 1541 compatibility."
COMPUTE!'s Gazette August '87
DRIVE THE BEST
EXCELERATOR +
TURBO

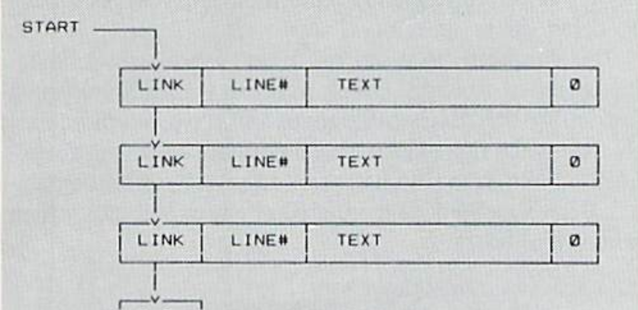



**DIAGRAM 1:**
*Basic Program in Graphic Form*

the program itself is stored in memory. M is a pointer (START) which gives the RAM starting address of the program. Its value depends upon which machine you are using. On the C-128 it also depends upon whether the 40-column high resolution graphics screen has been allocated or not.

On the screen, the first number of each pair is an address. The second number is the decimal value stored at that address. On the C-128 without the graphics memory allocated (in direct mode, type GRAPHICS CLR to de-allocate it), the first few values are as follows:

```
7169  23  7170  28  7171  10  7172   0
7173  77  7174 178  7175 194  7176  40
```

Although your sets of numbers may differ from these, we will use these values as an example.

The first two memory values at the start of this program are 23 and 28. These numbers form the link which guides the BASIC interpreter through the program. We will talk more about the link in a moment. The next two memory values, 10 and 0, represent the line number of this program line. BASIC calculates the actual line number by adding the first number to 256 times the second number (10 + 256*0 = 10).

The remaining values up to the first 0 at address 7190 on the C-128 correspond to the actual program text. For example, 77 is the ASCII value for M, and 178 is the special tokenized value for "=". PEEK is stored as the single byte 194 and the left parenthesis has the ASCII value 40. Thus we are looking at the first part of line 10.

Now back to the first two values which form the link. Take the first number and add it to 256 times the second number with a result of 7191. This gives the starting address of the next program line in memory. If we look at address 7190, we see a value of zero. A single zero is a marker at the end of each program line. Line 10 ends at address 7190. The next line starts at address 7191.

The bytes beginning at the start of the second line look like this:

```
7191  40  7192  28  7193  20  7194   0  7195  129
```

The first two bytes are the link (also called a pointer) to the start of the third line. The 20 and 0 represent the line number (20 + 0*256 = 20). The 129 is the token for the FOR statement.

The value of the link is (40 + 256*28) which is 7208. The next line must start at 7208. Also there must be a zero byte at address 7207. Sure enough, there is.

If we take the two bytes starting at 7208 (56 and 28) and convert them into a link value, we get (56 + 256*28) which is 24. When we look at 7224 and 7225 for the next link, we see a pair of zeroes. The link after the third program line has a value of 0, indicating that we have reached the end of the program. In fact there are three zeroes at the end of the third line, the standard "end of line" zero and the two zero-value link bytes.

The BASIC interpreter is able to step its way through the program lines the same way that we have. (You should be able to follow the sequence we have just discussed with different numbers for the C-64.)

Locating specific lines in a program is a sequential process. In order for BASIC to execute the subroutine called by the statement GOSUB 5000 for example, it starts at the first program line and follows the links until it finds a line with a line number of 5000. If there are 4999 lines to check, finding line 5000 may take a while. That is the reason some people put their frequently-used subroutines at the start of the program.

We have previously discussed the BASIC program structure most recently in *BASIC Magic* (January 1987 *Ahoy!*). Refer to that article for some of the tricks you can play with this linked-list program structure.

Just to give an idea of the types of applications you can write once you understand the structure, study this simple example. It prints the line numbers in a program along with their starting locations in memory:

```
10 DEF FNP(X)=PEEK(X)+256*PEEK(X+1)
20 PRINT "ADDRESS","LINE# "
30 AD=45 : IF DS$="" THEN AD=43
40 AD=FNP(AD)
50 IF FNP(AD)=0 THEN END
60 LN=FNP(AD+2)
70 PRINT AD,LN
80 GOTO 40
```

Line 10 defines a function which calculates the value of the link (pointer) or the line number at a given address. Line 30 sets up the initial address for the C-128 and changes it if the program is being run on the C-64. Recall that DS$ is a special disk-status variable for the C-128, but it has a null value (unless otherwise defined) on the C-64.

Initially line 40 gets the starting address of the program, just as we discussed earlier. Once we reach the double zeroes at the end of the program, the link at that address is zero, and line 50 causes the program to end.

Line 60 evaluates the line number for the current program line in memory. From our earliest discussion, we saw that the first two bytes of each line are the link, and the next two bytes (at AD+2 and AD+3) are the line number. Line 70 prints the results, and line 80 goes back for more.

The program is deceptively simple. You should carefully study it to fully understand the process of accessing links

and line numbers. You could expand upon this program to perform various other tasks. For example, search for REM tokens and list (or skip) only the lines containing them. Routines like these could be added to longer programs to aid in debugging.

### TWO LINKS ARE BETTER THAN ONE

That is enough of a review of singly linked lists. Did you ever wonder why you can't scroll backward while editing a BASIC program as you can through a document in your word processor? Perhaps one reason is that the BASIC program is stored with single, forward-pointing links. If each program line held a link to the previous line in memory as well as to the next line, perhaps the BASIC editor would back-scroll.

That brings us to the concept of doubly linked lists. Each item or node in the list has two links. One indicates the preceding node and the other indicates the next node.

See if you can translate the following sentence which is stored as a doubly linked list. Each node contains an information field and two links. The starting node is number 4.

| Node # | Info | Back Link | Next Link |
|---|---|---|---|
| 1 | ARE | 2 | 3 |
| 2 | LISTS | 4 | 1 |
| 3 | HANDY | 1 | −1 |
| 4 | LINKED | −1 | 2 |

The information in the first node number 4 is "LINKED". The Next Link at node number 4 is 2. Therefore the second word in the sentence is "LISTS" at node 2. The Next Link pointer at node 2 leads to "ARE" at node 1. Finally, node 1's Next Link pointer brings us to node 3 which is "HANDY". Its pointer has the null value shown as −1 indicating the end of the list. The decoded sentence is "Linked lists are handy."

Obviously we do not need the Back Links to interpret the sentence. In fact with some effort we could even read the sentence backward without the Back Links. Here is how we might do it. We could search the Next Links until we found the null value −1 at node 3. This tells us that the last node in the list is number 3 ("HANDY").

Then we could search through the Next Links until we found the node that pointed to node number 3, namely node 1 ("ARE"). We then look for the node with a Next Link value of 1. This is node 2 ("LISTS"). Another search shows that node 4 ("LINKED") points to node 2. One more time through the Next Link list shows us that no node points to node 4. Therefore we have completed our backward journey through the list with the result "Handy are lists linked."

If this were a 10,000 word document, it would be very time consuming to search through the list each time to find every preceding node. The Back Links make the backwards search as easy as the forward search.

Start with the last node number 3 ("HANDY"). Its Back Link points to node number 1 ("ARE"). That node points back to number 2 ("LISTS") which leads back to number 4 ("LINKED"). Node #4's Back Link has a null value, signifying the end of the list. At the expense of additional memory usage, we have greatly simplified backward searching by using Back Links.

The algorithm discussed last month for inserting and deleting nodes of singly linked lists can be readily adapted for doubly linked lists. With back links, we can more easily delete any node since we do not have to perform a sequential search for the node preceding the one to be deleted. The Back Link of the node to be removed tells which node precedes it.

### GOING IN CIRCLES

Singly linked and doubly linked lists can be modified in various ways to create other types of data structures. A circular list is easily implemented, for example. Simply change the null value of the final Next Link so that it points back to the first node. With the doubly linked list, also change the first node's Back Link to point to the last node in the list.

Most word processors and editors have separate forward search and backward search functions. I have come across one editor which implements the search function in the following very useful manner: the editor begins searching forward from wherever the cursor is within the text. When it reaches the end of the document, it jumps to the start of the text and continues searching until it comes back to the cursor position.

If the document to be searched is stored as a circular list, it would be easy to mark or store the cursor position and then step forward through the list until arriving once again at the marked position. In the process, the entire document will have been searched. Every editor should be equipped with this capability.

Another major category of data structures are trees. With the tree structure, each node may have links to two or more succeeding nodes. Many types of data ranging from genealogical family trees to algebraic expressions are readily represented in terms of the tree structure.

The best-known authority on trees and data structures in general is the book *Fundamental Algorithms* which is volume 1 of *The Art of Computer Programming* by Donald Knuth (Addison-Wesley, 1973). The book is packed with algorithms and examples of numerous data structures. There are many other excellent sources of information on these topics under the category of programming and data structures at the library or book store.

### INTO THE MAZE

We will wrap up our discussion of amazing data structures with a program which uses doubly linked lists to help the computer find its way through a maze. Refer to the program *Amazement* on page 98. The program allows the computer to follow paths through a maze until it finds a path which reaches the exit. The allowed paths through the maze are specified in the DATA statements beginning line 1210. A 0 indicates that the cell is inaccessible. A 1 shows that the cell is accessible. Somewhere in the maze should be a 3 indicating the starting cell and a 4 indicating the ending cell. The computer replaces a cell status value with 2 once it lands on the cell.

The comments at line 1100 describe the array data struc-

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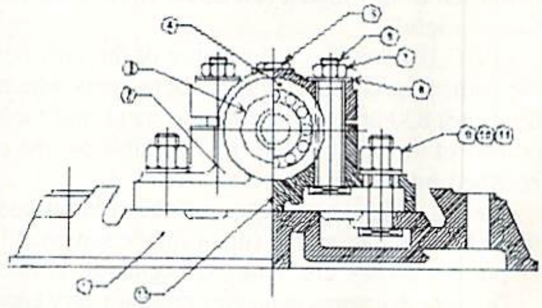
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ture of the maze. The cells are in a 10 by 10 square, numbered from 1 to 100. The top row is numbered 1 through 10, second row is 11 through 20, and bottom row is 91 through 100.

For cell number C, its maze structure status MS(C,0) has the value shown in the DATA statements at line 1210 as discussed above. The other four elements of MS( ) for cell C give the numbers of the cells adjacent to cell C. With respect to cell C, the four directions are numbered 1 through 4. Direction 1 is up, 2 is to the right, 3 is down, and 4 is to the left of cell C.

If cell C has no neighbor in a particular direction, the corresponding element of MS( ) has a value of 0. For example, consider cell 7 in the top row. Direction 1 is up, and cell 7 has no adjacent cell above, so MS(7,1) is 0. The cell to the right is number 8, so MS(7,2) is 8. The cell below number 7 is number 17 (since the maze is 10 cells wide), and MS(7,3) is 17. Since the cell to the left of number 7 is number 6, MS(7,4) is 6. The FOR-NEXT loop at line 1340 calculates the values of MS(C,1) through MS(C,4).

The computer's moves are stored in a doubly linked list MV( ). In this doubly linked list, MV(C,0) is a forward link indicating the next *direction* to move, and MV(C,1) is the back link telling the previous *cell number.*

When the cursor is in cell C, MV(C,0) keeps track of which direction to move from cell C. The computer always tries first to move in direction number 1 (up) from each cell, if it can. If an upward move is not valid, then MV(C,0) is incremented to 2 in line 320 indicating that the computer will move to the right. A move in a certain direction is invalid if that cell is inaccessible or has already been visited in the current path.

If direction number 2 (right) is not valid, then the computer tries directions 3 (down) and then 4 (left). If there is no valid move from cell C, then the computer backs up to the cell from which it just came. Here is where the back link is useful.

MV(C,1) stores the cell number of the previous cell on the path. Line 820 uses this value to know where to back up. Lines 830 and 840 restore the status and the direction pointer of the cell just left. It is possible for the cell to be revisited on a different path.

The X( ) and Y( ) arrays store the column and row information for putting the cursor on the screen at the proper position. They are assigned beginning at line 1500.

The data structures make this program very easy to write and modify. The main loop is contained in lines 170 through 250. Each move is selected by the subroutine at line 300. There the direction pointer of the current cell MV(C,0) is incremented in line 320.

The subroutine at line 400 determines if the selected direction is less than or equal to 4. If not, all paths from this cell have been tried unsuccessfully, and the only thing to do is retreat. The BKUP flag is set to indicate this.

If the direction is a valid number (less than 5), line 430 uses the forward link to calculate the cell number in that direction. Line 440 checks the status of that cell. If it is inaccessible (0), occupied (2), or the starting cell (3), the move is invalid, and the routine at line 610 resets the GDMOVE flag.

Line 620 checks to see if we are back at the starting cell and have tried all possible directions from it. If so, all paths have been exhausted, there is no solution to the maze, and the NOSOLN flag is set.

If the cell in the chosen direction is the exit cell (4), the exit routine at line 710 is called. If the next cell chosen is not the exit cell, the valid move routine at line 510 is called instead. It is almost the same as the exit routine except that the status of the next cell MS(NXTCELL,0) is changed to occupied (2). The XIT flag is set when the exit cell is reached.

Once the move is determined, the main routine calls the screen update routine at line 900. It positions the cursor and blinks it in the selected cell. The maze is originally drawn during the initialization by the routine at line 1700.

On the screen, an inaccessible cell in the maze is shown as a dot. An unoccupied accessible cell is an asterisk. The start and end of the maze are shown as S and E. As the computer moves through the maze, its position is shown by a blinking O. The current path is shown by O's.

Once the end of the maze has been reached, line 230 of the main loop calls the routine at line 3010 to step backward then forward along the chosen path. Line 3020 shows how easily the back links MV(C,1) can be used to step backward through the maze. Line 3040 shows how the forward direction link MV(C,0) can be used to move forward through the maze.

Feel free to modify this program. Change the amount of delay between blinks of the cursor in line 120. The number of cells in the maze NC can be changed in line 50. You must use a square number for NC or the screen display will not be correct.

If you change the number of cells, you should change the lengths of the DATA statements at line 1210 to match. There are some interesting results from changing the allowed paths through the maze. For example, if there are four 1's (asterisks) forming a square on a path in the maze, the cursor seems to perform a dance as it navigates the path in all possible sequences.

As written, the program stops once it finds the first solution. It would be possible to modify the program to continue, keeping track of the length of each solution, until all possible paths have been exhausted. Then the shortest (or longest) path could be displayed.

You might add some more intelligence to the movement algorithm. For example, have the computer look at all adjacent cells each step of the way. Notice when you run the sample maze listed, the computer goes right past the exit cell in its feebleminded attempts to "go in direction 2, if possible, before going in direction 3."

It would be possible to create a program similar to this without linked lists. Perhaps a stack or a tree data structure would be more efficient than the doubly linked list used here. No single data structure is best for all applications. A familiarity with the possible data structures is certainly to your advantage for writing readable, debuggable, and efficient programs. Put an end to those spaghetti-coded, entangled programs. It is amazing what the proper data structures can do. ☐

***SEE PROGRAM LISTING ON PAGE 98***

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The C128 Helper is machine language driven for speed. It works in the C128's 80 column mode with an RGB or composite monitor. You can use either a 1571 or, with slightly slower response time, a 1541 drive.

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But perhaps the single most exciting feature is this: the program is user definable. Not only can you modify the C128 Helper itself, but you can actually edit and create your own custom files! The program guides you with prompts, helping you to easily construct your own custom applications, complete with menus! You could make your own memo pads, calendars, electronic helpers for other programs—the list is endless!

But even if you only use the C128 Helper itself, you'll be getting more than your money's worth. Get your copy today!

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■ REQUIRES the Super Snapshot cartridge to create! ■ Does NOT need Super Snapshot cartridge to display! ■ Display at least 12 slides with 1541 or 24 with 1571! ■ Slideshow can even be ported to the new 1581 disk drive ■ Super Snapshot Slideshow Creator supports two drives! ■ Includes fade in/out and pop on/off special effects! ■ 10 fonts available for custom scrolling text displays! ■ Built in fast loader routine for high speed displays! ■ Amazing low price—ORDER YOURS TODAY!

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Reader Service No. 297

# FLOTSAM

I have now been a subscriber to *Ahoy!* Magazine for three years, and have again renewed my subscription.

Perhaps I should explain, I am 72 years of age and an avid computerist and have been thoroughly disgusted because, no matter how I tried, I could NOT enter your programs from the magazine and make them run.

That problem is solved, THANK YOU, with the help of Buck Childress and your excellently updated and improved *Bug Repellent* programs.

I had to write and compliment you on the above, and especially for the fine articles, programs, and excellent coverage of the Commodore line.

Again, many thanks for your past help and my wishes for your continued success.

—Thane Weisberg
Portland, OR

There is an unfortunate similarity in name as between our company and Schneider Software, concerning which you printed a "Buyer Beware" mention in the August 1987 issue of *Ahoy!*, page 61. There is no connection whatsoever between Schnedler Systems and Schneider Software. We at Schnedler Systems have always tried to be highly responsive to our customers, to deliver good value, and to always have advertised products in stock. Among the enclosed materials you will find two reprints from the "Inside Commodore" column of *Computer Shopper* magazine which are evidence of the type of product and customer service we offer.

The mention in *Ahoy!* has in fact caused us problems. Several recent customers have referred to it before placing orders, expressing hesitancy, and required reassurance that we are in fact a different company before they would proceed. While there is no way of knowing, I suspect there are others who have been dissuaded entirely from any contact with us whatsoever. It is easy to see how persons become confused: Schneider and Schnedler appear very similar, especially if not familiar with either, and in both cases the initials are "SS."

I am asking you therefore if you would try and remedy this situation by printing an explanation in a future issue, pointing out that we are in fact different companies. Any consideration we can be shown along these lines would be greatly appreciated.

—Steven C. Schnedler
Schnedler Systems
25 Eastwood Road, P.O. Box 5964
Asheville, NC 28813

*We're truly distressed that Schneider Software's failure to fulfill orders has resulted in problems for Schnedler Systems. Schnedler Systems has advertised in* Ahoy! *numerous times in the past, and we've received no complaints concerning them from readers. We request that anyone reading this spread the word via user's groups, bulletin boards, etc.*

Reader Service No. 114



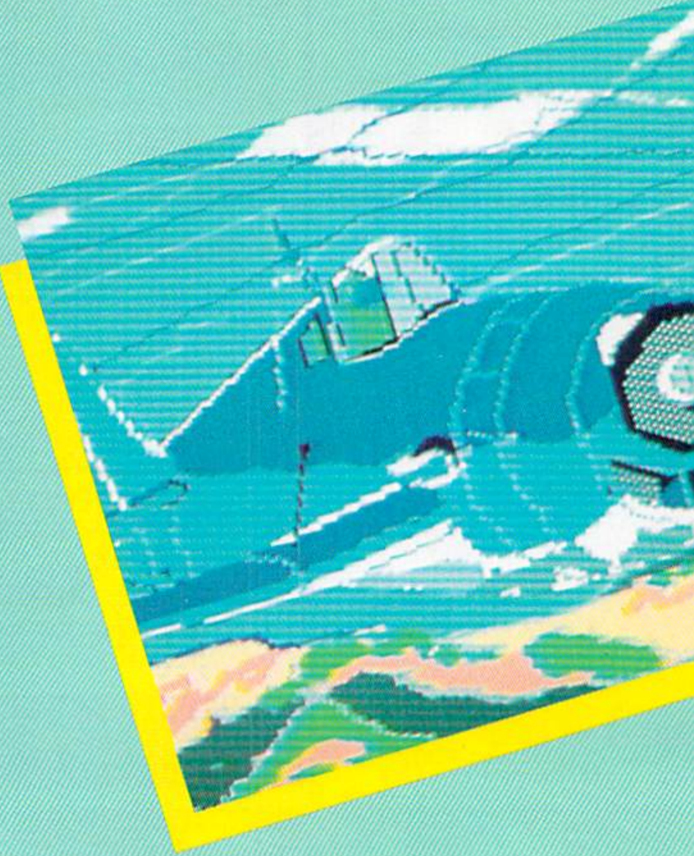

**Art Gallery Disk Sale**

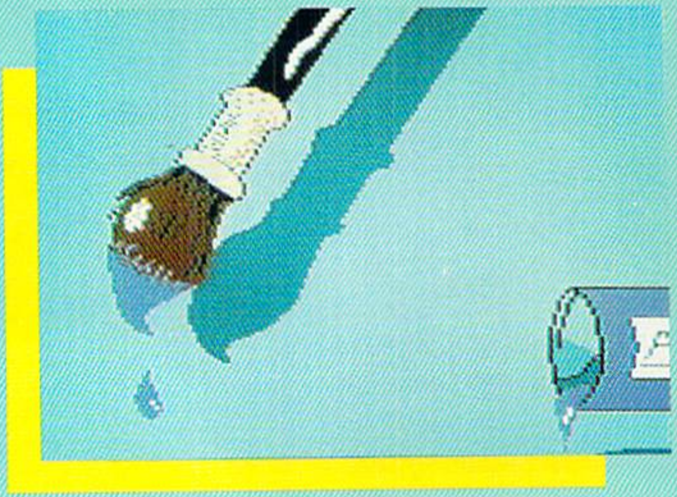
Selected *Art Gallery* images are available on disk. Multicolor images are supplied in *Koala* format, while high-resolution images are in *DOODLE!* format. Included are a slide show for easy viewing, along with a bit map dump for your 1525 printer or properly interfaced equivalent. A sample *Art Gallery* disk with slide show and printer dumps is $10; or send a stamped and self-addressed envelope (business size) for a listing of available *Art Gallery* collection disks. Prices shown are for US and Canada. All others add $3 per disk. New York State residents please add appropriate sales taxes. Disks may be ordered from Morton Kevelson, P.O. Box 290260, Homecrest Station, Brooklyn, NY 11229-0005.

**Contribute to Ahoy!'s Art Gallery**

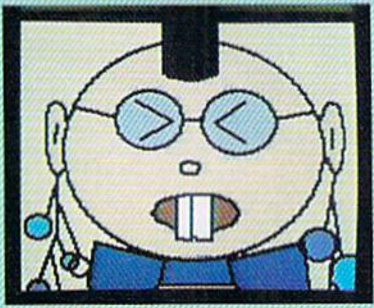
The *Ahoy! Art Gallery* offers the opportunity for fame and fortune to any and all aspiring Commodore artists. Simply send Morton (see address above) your work on disk indicating the drawing package or file format of the images. Inclusion of a self-addressed post card will guarantee an immediate response. All graphics produced on the C-64/C-128, Plus/4, and Amiga computers are eligible. If your image is published, you will receive a free one-year subscription to *Ahoy!* If you are already a subscriber, your subscription will be extended by one year.

Note that the *Art Gallery* is not a contest. Published pictures are selected in an arbitrary and capricious fashion by the *Ahoy!* Art Director based solely on the artistic merit of the individual images.

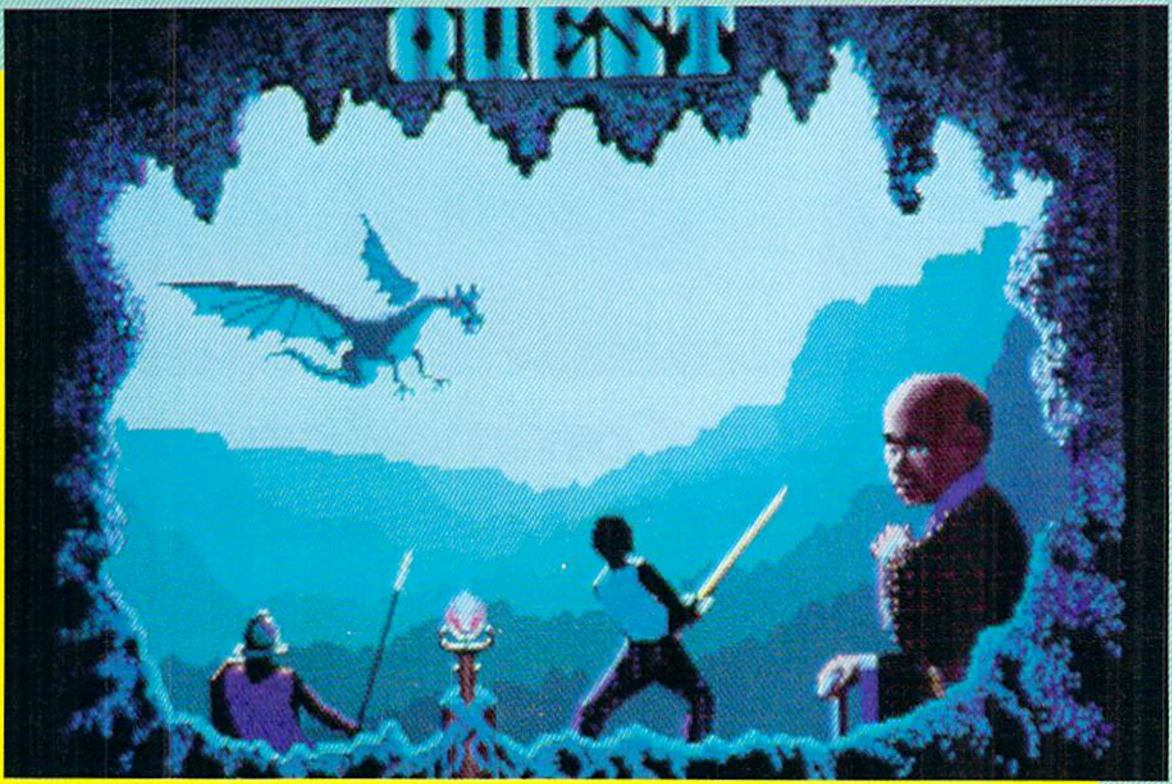




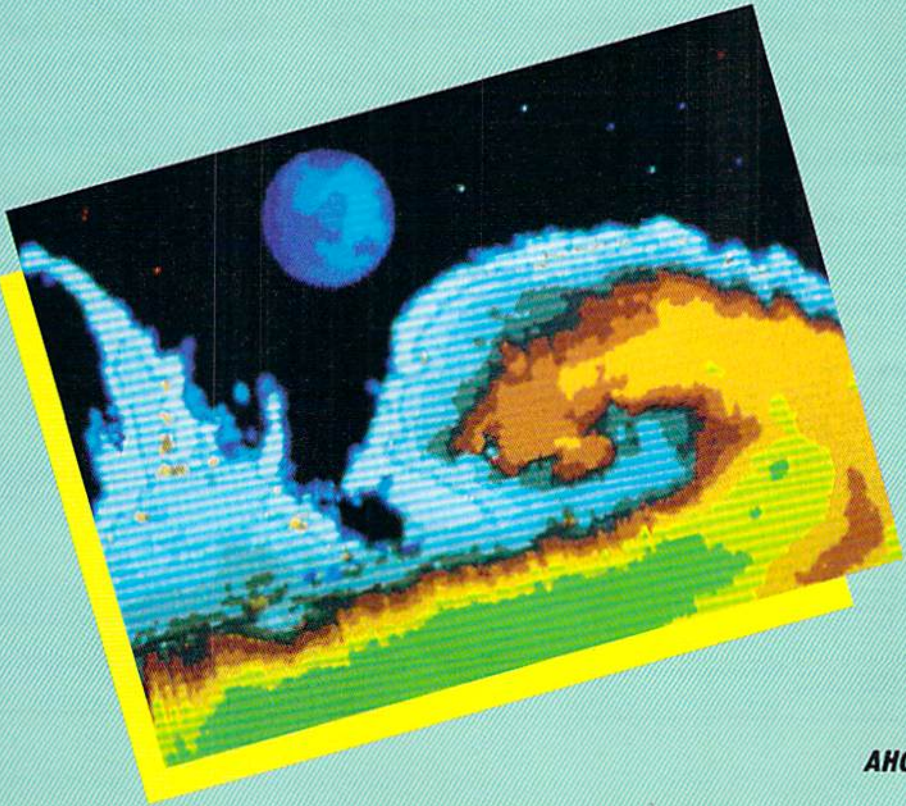
At extreme lower left is *Brush*, given to us by Peter Leontescu (Bronx, NY). The other two on the facing page are *Dragon* by Wong, Chin Wah (Quezon City, Philippines)—one of a group submitted by the Society of Commodore Users of Manila (S.C.U.M. for short)—and *Flight* by Michael J. Garze (Edison, NJ). To the right is *Chinese Cartoon*, also by Peter Leontescu. Everything mentioned thus far was drawn on the 64 with *Koala*. Below are two *Deluxe Paint*-ed Amiga graphics: *Quest* by Glenn S. Adkins (Palm Beach, FL) and *Sundance* by Kiernan Holland (Roanoke, TX).

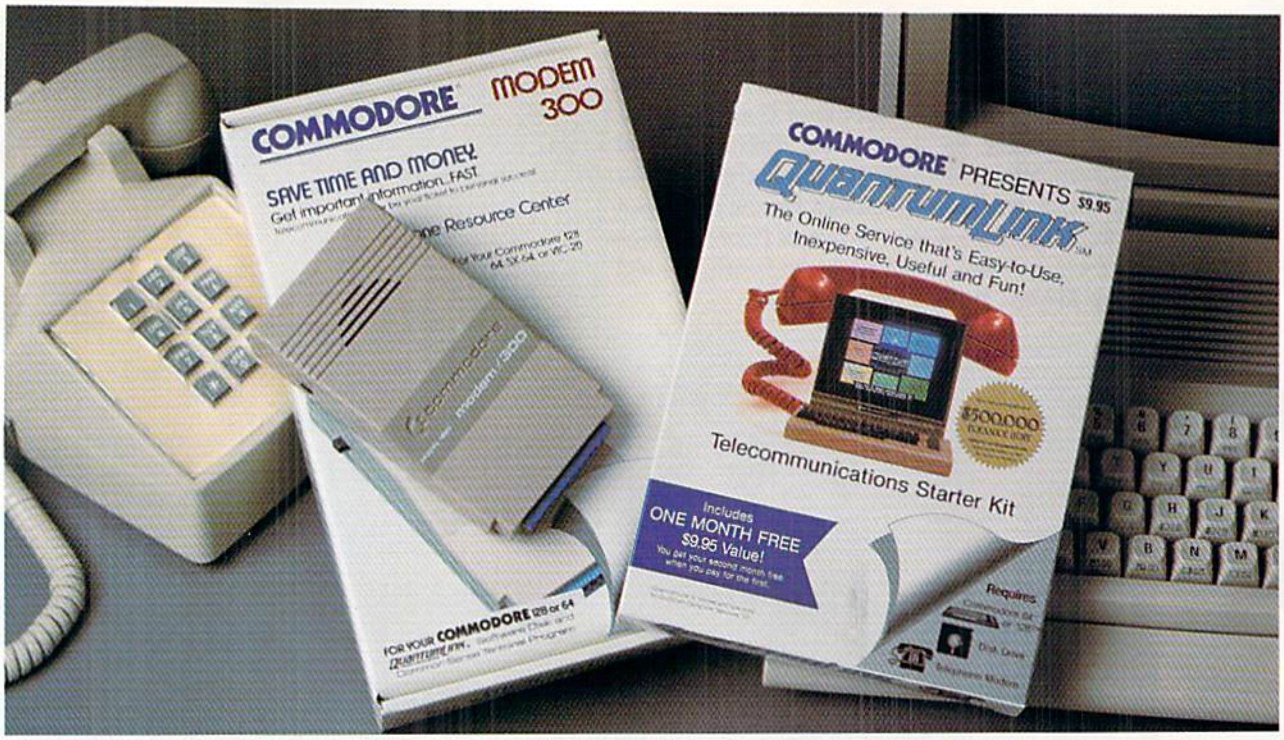











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# TIPS AHOY!

## Compiled by Michael R. Davila

Contributors to *Tips Ahoy!* will be compensated at highly competitive industry rates immediately upon acceptance. Send your best programming and hardware hints to *Tips Ahoy!*, c/o Ion International Inc., 45 West 34th Street—Suite 500, New York, NY 10001. You must include a stamped and self-addressed envelope if you want your submissions returned.

### TECHNI-TITLES

You can brighten up the sometimes bland look of title screens with this simple program which can be used as a subroutine. Put your title text into data statements one word at a time. The LEN and RND functions work to print your titles in a variety of technicolor characters.

Depending upon your screen's current background color, you may need to eliminate text colors that don't look right. To test your color schemes, add a REM statement in LINE 80, remove the first one in LINE 70, and run *Techni-Titles.* Numbers in black are the keyboard color numbers. For those colors you don't like, just add new values in the "IF V=" lines between line 40 and line 60.

After your testing, be sure to put LINE 70 and 80 back into original REM condition. —Gene Majewski
Bellwood, IL

```
·10 REM *** TECHNI-TITLE ***
·15 REM *********************
·20 PRINT"[CLEAR]":K=(PEEK(53281))-240
·25 READA$:IFA$="XX"THENPRINT"[c 7]":END
·30 L=LEN(A$):FORX=1TOL
·35 M$=MID$(A$,X,1)
·40 V=INT(RND(1)*16):IFV=0THENV=4
·45 IFV=10THENV=11
·50 IFV=9THENV=11
·55 IFV=KTHENV=V+1:IFV=16THENV=1
·60 POKE646,V
·65 :
·70 REM PRINTM$;"[BLACK]";V;"  ";:REM * C
 OLOR TEST///TEST: REMOVE REM IN 50 ADD I
 N 60
·75 :
·80 PRINTM$;
·85 NEXT:PRINT" ";
·90 GOTO25
·95 DATA THIS,IS,A,COLORFUL,TECNI-TITLE,X
 X
```

### THE AMAZING C-128 INDESTRUCTIBLE SCREEN CLOCK MONSTER

Everybody has seen interrupt-driven screen clocks in computer magazines before. Everybody knows what is usually wrong with the program that makes it hardly worth typing in...it is never immune to RUN STOP/RESTORE, which the average computer hacker hits about every 15 seconds while debugging!

The short machine language program below will keep you updated on the time all through the night, with no weird SYS commands to reactivate it! Type the data statements in carefully, and run the BASIC loader. The computer will prompt you for the time in 9 digit format, and will boot the machine language up for you. The time appears in the upper right hand corner of the screen. You can hit the RESTORE sequence 5000 times without the interrupt-driven clock missing a millisecond. It is CIA operated, so I/O also has no effect on clock operation. The only way to destroy this monster is with a system reset, or turning the computer off! I know the program will come in handy to all those late-night hackers out there. —Cleve Blakemore
Richmond, VA

```
·10 REM C-128 INDESTRUCTIBLE SCREEN CLOCK
·20 FORX=3072TO3188:READA:POKEX,A:I=I+A:N
 EXT
·30 IFI<>10127THENPRINT"ERROR IN DATA[6"!
 "]":STOP
·40 INPUT"ENTER TIME (HHMMSS):";T$:POKE56
 331,16*VAL(MID$(T$,1,1))+VAL(MID$(T$,2,1
 )):POKE56330,16*VAL(MID$(T$,3,1))+VAL(MI
 D$(T$,4,1))
·50 POKE56329,16*VAL(MID$(T$,5,1))+VAL(MI
 D$(T$,6,1)):POKE56328,0
·60 SYS3072:SYS3171:PRINT"SCREEN CLOCK NO
 W IN OPERATION.":END
·3072 DATA120,169,13,141,20,3
·3078 DATA169,12,141,21,3,88
·3084 DATA96,169,186,141,34,4
·3090 DATA141,37,4,173,11,220
·3096 DATA41,16,74,74,74,74
·3102 DATA9,176,141,32,4,173
·3108 DATA11,220,41,15,9,176
·3114 DATA141,33,4,173,10,220
·3120 DATA41,240,74,74,74,74
·3126 DATA9,176,141,35,4,173
·3132 DATA10,220,41,15,9,176
·3138 DATA141,36,4,173,9,220
·3144 DATA41,240,74,74,74,74
·3150 DATA9,176,141,38,4,173
·3156 DATA9,220,41,15,9,176
·3162 DATA141,39,4,173,8,220
·3168 DATA76,101,250,169,110,141
·3174 DATA0,10,169,12,141,1
·3180 DATA10,96,32,0,12,76
·3186 DATA3,64,255,255,144,128
```

### SPRITE PRINT 128

*Sprite Print 128* is a short utility for the Commodore 128 that lets you display a grid pattern on any sprite. After typing in and running the program, you will be asked for a

demonstration or to end the program. Before choosing the demo, make sure your printer is on. After hitting the space bar, you will be asked to enter the number of the sprite you wish to display. Answer this prompt and hit RETURN. The sprite will then be displayed on the printer in a grid formation. This enables you to see the direct correlation between pixels of the sprite.

A small machine language routine is used to print the binary equivalent of each byte of the sprite. To incorporate this routine into your own programs as a binary converter, simply follow these steps. First, change the hexadecimal value CF in line 60 to a 30 and the value A6 in line 70 to a 31. After the machine language has been entered in memory by RUNning the BASIC loader, simply use SYS SL (a decimal value between zero and 255 or your own variable). To see what I mean, carry out the above steps. When you encounter the error message, simply ignore it. In immediate mode, type SYS SL,200. You will then see the binary equivalent of decimal number 200. NOTE: This machine language routine uses device three as the output device, which defaults to the screen. —Michael Jaecks
Alamogordo, NM

```
•10 REM SPRITE PRINT 128
•20 SL=4864 : REM STARTING ADDRESS
•30 FORI=0TO36:READA$:A=DEC(A$):POKESL+I,
 A:B=B+A:NEXT
•40 IFB<>5362THENPRINT"ERROR IN DATA STAT
 EMENTS!":END
•50 DATA 85,FA,A2,03,20,C9,FF,A2,08,A5
•60 DATA FA,29,01,D0,04,A9,CF,D0,02,A9
•70 DATA A6,48,46,FA,CA,D0,EE,A2,08,68
•80 DATA 20,D2,FF,CA,D0,F9,60
•90 REM DEMO
•100 PRINT "HIT <SPACE BAR> FOR DEMONSTRA
 TION OR":PRINT"ANY OTHER KEY TO END":PRI
 NT:GETKEYA$:IFA$<>" "THENEND
•110 SP=3584:REM STARTING ADDRESS FOR SPR
 ITE #1
•120 INPUT"SPRITE NUMBER";A:IFA>8THEN120:
 ELSE:A=A-1:B=A*64:SP=SP+B
•130 OPEN3,4:FORI=0TO60STEP3:PRINT#3,CHR$
 (15);:FORJ=0TO2:SYS(SL),PEEK(SP+I+J):NEX
 TJ:PRINT#3,CHR$(165);CHR$(8):NEXTI
•140 FORI=0TO23:PRINT#3,CHR$(15);CHR$(163
 );:NEXTI:PRINT#3:CLOSE3:END
```

## SCROLL-A-MATIC

Ever wish your 64 could scroll the screen down? Maybe you need to add something above, or perhaps you just want to watch everything head south for a change. Unfortunately, Ol' Reliable doesn't remember the adage, "What goes up must come down." Well, by golly, *Scroll-a-Matic* will pack it into its memory. *Scroll-a-Matic* enables your 64 to scroll the entire screen down with ease. It can also scroll up with equal agility.

After saving a copy, run *Scroll-a-Matic*. Once the loader POKEs the data into memory, type SYS 53000, then press RETURN. To scroll down, press SHIFT and F1. The screen pops down a line. Press them again to scroll another line down. If you want a continued downward scroll, press SHIFT and F3. The screen rolls downward like a cannonball on a slide. SHIFT and F5 scrolls up a line at a time. SHIFT and F7 shoots the screen up like an Atlas rocket.

*Scroll-a-Matic* waits until the cursor is off before doing its work. This keeps the cursor's footprint from inadvertently being carried along for the ride. So, if the screen doesn't move the instant you prss the keys, hang tough. It will in a flash (what pun?!).

If you happen to be in quote or insert mode, *Scroll-a-Matic* won't budge. This lets you use the function key graphics in your programs.

*Scroll-a-Matic* is set to load at 53000. If you want to put it somewhere else, just change the variable S in line 4. It occupies 168 bytes, so be sure you have room in your new location.

If you really want to have some fun, place four or five lines in the middle of your screen. Press SHIFT and F3 (fast down), then quickly press SHIFT and F7 (fast up). Continue back and forth like this and see how long you can watch the lines go up and down before you get dizzy and fall out of your chair.

RUN STOP/RESTORE deactivates *Scroll-a-Matic*. SYS 53000 (or wherever you've placed it) reactivates it.

Give *Scroll-a-Matic* a spin. You'll have the first Commodore 64 yo-yo on the block. —Buck Childress
Salem, OR

```
•2 PRINTCHR$(147)"LOADING DATA ";
•4 S=53000:REM *** CHANGE S TO RELOCATE *
 **
•6 FORJ=STOS+167:READA:POKEJ,A:X=X+A:PRIN
 TCHR$(42);:NEXTJ:PRINT:PRINT
•8 IFX<>22661THENPRINT"ERROR IN DATA[3"."
 ]":END
•10 PRINT"DATA OK [3"*"] SYS"S"TO ACTIVAT
 E[3"."]"
•12 B=INT(S/256):POKES+1,S-(B*256)+13:POK
 ES+3,B:END
•14 DATA169,21,162,207,120,141,143,2,142,
 144,2,88
•16 DATA96,173,141,2,201,1,208,40,165,212
 ,208,36
•18 DATA165,216,208,32,165,207,208,28,165
 ,203,166,2
•20 DATA133,2,201,4,240,21,201,5,240,25,2
 01,6
•22 DATA240,13,201,3,208,6,32,234,232,32,
 240,233
•24 DATA76,72,235,228,2,240,249,201,6,240
 ,239,169
•26 DATA152,162,7,160,219,133,251,133,253
 ,134,252,132
•28 DATA254,169,192,133,63,133,65,134,64,
 132,66,160
•30 DATA39,177,251,145,63,177,253,145,65,
 136,16,245
•32 DATA165,251,56,233,40,133,251,165,253
```

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Copyright 1985 Megasoft Limited. ★
Again this is a very unusual although very popular data disk that works with Print Shop and Print Master. Please, you must be 18 to order this program.

**$24.95**

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```
,56,233,40
•34 DATA133,253,176,4,198,252,198,254,165
,63,56,233
•36 DATA40,133,63,165,65,56,233,40,133,65
,176,4
•38 DATA198,64,198,66,165,252,201,4,176,1
97,169,32
•40 DATA160,39,153,0,4,136,16,250,76,72,2
35,0
```

### NO LOADS

When typing in BASIC programs on the C-128, I sometimes accidentally hit the SHIFT and RUN STOP keys. This executes a BASIC load from a disk drive and runs the program. If that happens, your current program is lost. By typing in and running the following one-line program, you can redefine the SHIFTed and RUN STOP key to only run a program and not load anything from the disk drive.

—Michael Jaecks
Alamogordo, NM

```
•10 FORI=0TO8:READA:POKE4159+I,A:NEXTI:DA
TA 82,85,78,13,0,0,0,0,0
```

### SHORT SLEEP

This little quirk that I have found in the Commodore 128's sleep command will allow you to use the sleep command for tenths of a second as well as full seconds. This short subroutine will effectively count down an onscreen timer from one minute to zero. The program also shows the versatility of the DO-LOOP command. The program, for some reason, will only work in 80 columns. Also, make sure that you type in all five 9's in line 50.

```
•10 PRINT"[CLEAR]":X$="##.#":X=60
•20 DO
•30 PRINT"[HOME]";
•40 PRINTUSINGX$;X
•50 SLEEP.99999:REM USE ALL FIVE 9'S
•60 X=X-.1
•70 IFX<0THENEXIT
•80 LOOP
•90 END
```

I also found out that if you use more or fewer 9's after the decimal in line 50, you can vary the length of the pause.

—Keith Abramovitz
Cassville, MO

### SMOOTH MOVE

Have you ever tried to make something move across the screen by using TAB statements, and ended up being disappointed because the symbol didn't move smoothly enough? If so, this tip is definitely for you.

This program makes use of a series of built-in graphics symbols that when put in the right sequence create a seemingly hi-res movement. You will be amazed at how beautifully the tiny vertical bar glides the width of the screen.

—Marty Grebing
Cape Girardeau, MO

```
•5 REM SMOOTH MOVE
•10 PRINT CHR$(147)
•20 G$="[c G][s T][s G][s B][s H][s Y][c
M]"
•30 FOR G=1 TO 37: FOR A=1TO7: A$=MID$(G$
,A,1)
•40 PRINTCHR$(19)TAB(G)" "A$
•50 NEXT A:NEXT G
```

### THE COUNT

Are you the curious type? Ever want to know how many lines are in your BASIC programs? I always do. The way I see it, I let the lines reside rent-free in my RAM. So an occasional count to keep me informed on the number of those residents isn't too much to ask. Unfortunately, counting them the old-fashioned way is a real pain in the neck. It could drive a person batty. The longer the program, the bigger the pain...until now. Here's *The Count.*

*The Count* takes the byte out of this once gruesome chore. It goes straight for that pain in the neck by instantly telling you the number of lines in your BASIC programs. There's a version for the C-64 and C-128

Just load and run *The Count.* It remains undisturbed in a free area of memory while you load, save, or work on your BASIC programs.

To use *The Count,* type SYS 700 for the C-64 or SYS 3072 if you're on the C-128. Now press RETURN. Voilà... you'll instantly see how many lines your masterpiece has hanging from its neck!

Both versions can easily be relocated if you want. Just change the variable A in line 2 to your new starting address. Don't forget to SYS there if you do.

—Buck Childress
Salem, OR

#### C-64 VERSION

```
•1 REM *** THE COUNT...C-64 ***
•2 A=700:REM *** CHANGE A TO RELOCATE ***
•3 PRINTCHR$(147)"LOADING";
•4 FORB=ATOA+38:READC:POKEB,C:D=D+C:PRINT
".";:NEXTB
•5 PRINT:PRINT:IFD<>6713THENPRINT"ERROR I
N DATA[3"."]":END
•6 PRINT"OK * SYS"A"TO COUNT[3"."]":END
•7 DATA160,0,132,251,132,252,165,43,166,4
4,133,253
•8 DATA134,254,200,177,253,240,13,230,251
,208,2,230
•9 DATA252,170,136,177,253,184,80,234,165
,252,166,251
•10 DATA76,205,189
```

#### C-128 VERSION

```
•1 REM *** THE COUNT...C-128 ***
•2 A=3072:REM *** CHANGE A TO RELOCATE **
*
•3 PRINTCHR$(147)"LOADING";
•4 FORB=ATOA+48:READC:POKEB,C:D=D+C:PRINT
```

```
".";:NEXTB
•5 PRINT:PRINT:IFD<>7698THENPRINT"ERROR I
N DATA[3"."]":END
•6 PRINT"OK * SYS"A"TO COUNT[3"."]":END
•7 DATA169,63,141,0,255,160,0,132,251,132
,252,165
•8 DATA45,166,46,133,253,134,254,200,177,
253,240,13
•9 DATA230,251,208,2,230,252,170,136,177,
253,184,80
•10 DATA234,165,252,166,251,160,0,140,0,2
55,76,50,142
```

## NO SCROLL! 64

Whenever I issue a LIST command, I wish I had a way to pause the listing while I write down a note or two. The 128's NO SCROLL key serves this purpose fine, but it only works in 128 mode on a C-128. It was for this reason that I wrote *No Scroll! 64*. And *No Scroll! 64* also acts as a complete pause feature, so you can also pause your program's execution at anytime.

Note that *No Scroll! 64* is immune to the RUN STOP/RESTORE reset sequence. It also doesn't work well with enhancer cartridges such as the Fast Load cartridge from Epyx, but works quite well with most BASIC programs and a lot of ML programs. But probably most important–NEVER activate *No Scroll! 64* during a disk operation as it will inevitably result in a lockup. —Jim Partin
Cincinnati, OH

```
•10 REM NO SCROLL! 64 BY JIM PARTIN
•20 FORT=679TO766:READA:POKET,A:NEXTT
•30 SYS679
•40 DATA169,178,141,24,3,169
•50 DATA2,141,25,3,96,72
•60 DATA138,72,152,72,173,13
•70 DATA221,16,3,76,114,254
•80 DATA173,254,2,208,55,32
•90 DATA188,246,32,225,255,208
•100 DATA15,32,21,253,32,163
•110 DATA253,32,24,229,32,167
•120 DATA2,108,2,160,169,1
•130 DATA141,254,2,238,32,208
•140 DATA32,159,255,165,203,201
•150 DATA1,240,3,76,227,2
•160 DATA206,32,208,169,0,141
•170 DATA254,2,169,0,133,198
•180 DATA76,188,254,0
```

## CAPS-LOCK 64

What do the C-128 and Amiga have that the C-64 doesn't? Well instead of giving a complete list, I'll give one example–a CAPS-LOCK feature. We 64 users have to use SHIFT-LOCK. SHIFT-LOCK is fine if you're just typing letters of the alphabet in capitals, but if you're also typing numbers of other symbols, you'll find yourself in a constant flurry of clicking that old SHIFT-LOCK key up and down to get the symbols you need. So what's the solution to your dilemma? *Caps-Lock 64*, of course!

*Caps-Lock 64* will set up a *Caps-Lock* feature in your 64 that's activated by holding down on the CONTROL (CTRL) key and hitting the F1 key. Likewise, it's deactivated by holding down on the CONTROL key and hitting F3. When the *Caps-Lock* feature is invoked, all letters of the alphabet that you type will appear as capitals, but all numerals and other special symbols will retain their non-SHIFTed appearances. Also, please note that holding down on the RUN STOP key and hitting the RESTORE key will deactivate the feature completely. If you wish to reactivate after doing this, just type SYS 53000. —Jim Partin
Cincinnati, OH

```
•10 REM CAPS-LOCK FOR THE C-64 BY JIM PAR
TIN
•20 FORT=49152TO49198:READDT:POKET,DT:NEX
TT
•30 SYS49152:POKE49153,0:POKE49154,224:PO
KE49156,0:POKE49157,224
•40 POKE49162,255:POKE49192,255:SYS49152
•50 FORT=53000TO53053:READA:POKET,A:NEXTT
•60 FORT=193TO218:READAD:POKE60289+AD,T:N
EXTT
•70 SYS53000
•80 PRINT"CTRL-F1 TO ACTIVATE CAPS-LOCK"
•90 PRINT"CTRL-F3 TO DEACTIVATE":END
•100 DATA173,0,160,141,0,160,172,5,192,19
2,191,240,23,238,1,192,238,4,192
•110 DATA173,4,192,240,3,76,0,192,238,2,1
92,238,5,192,76,0,192,172,4,192,192
•120 DATA255,240,3,76,13,192,96
•130 DATA120,169,21,141,20,3,169,207,141,
21,3,88,96,165,197,201,4,240
•140 DATA7,201,5,240,17,76,49,234,173,141
,2,201,4,208,4,169,53,133
•150 DATA1,76,49,234,173,141,2,201,4,208,
4,169,55,133,1,76,49,234
•160 DATA10,28,20,18,14,21,26,29,33,34,37
,42,36,39,38,41,62,17
•170 DATA13,22,30,31,9,23,25,12
```

## ROCK 'N ROLL

Looking for a way to put some flare in your action scenes? Maybe you have a program with cars crashing, earthquakes, or someone falling out of a chair. Wouldn't it be nice to add some rocking and rolling to the impact? *Rock 'n Roll* will!

Your screen comes alive as the characters bounce around like popcorn in a frying pan. *Rock 'n Roll* really adds punch to those crucial scenes on your C-64. Here's how to use it.

Add *Rock 'n Roll* to your own programs. It begins with line 63000, so appending will be easy. Have your program GOSUB or GOTO it to load the data into memory. Then, when the critical moment arrives (car crash, etc.), your program can SYS 53000. The characters on your screen will rock quickly around and gradually slow to a stop. *Rock 'n Roll* then returns to your program.

You can see a demonstration of *Rock 'n Roll* by itself. Just run it to load the data. Now list it so you'll have some

*Continued on page 113*

**Featured This Month:**



## DARKHORN

**The Avalon Hill Game Co.**
**Commodore 64**
**Disk; $30.00**

Are you the future monarch of Darkhorn? Find out by taking control of one of the four armies which are struggling for domination in this fantasy strategy game with optional action elements.

The most appealing thing about *Darkhorn* is that it can be played solitaire or by up to four people. The real-time command control system eliminates waiting while other participants enter orders, so *Darkhorn* moves along rapidly.

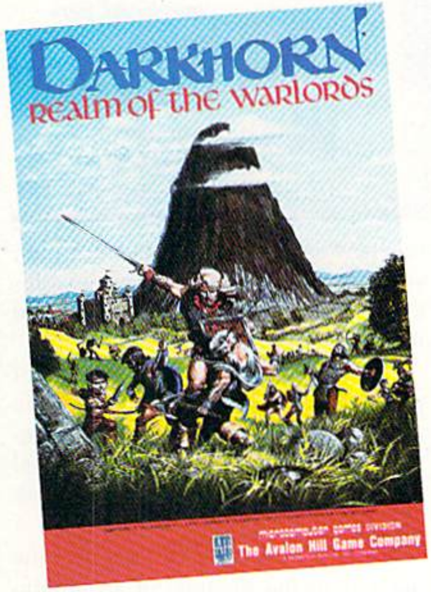
Each player becomes the leader of one of the four armies warring for control of Darkhorn: Balt (Human), Grum (dwarf), Aura (elf), and Dred (changeling). The computer controls all armies for which there is no human player.

Each race has unique capabilities. Humans are all-purpose fighters, dwarves are invulnerable to elvish magic, and elves use ranged weapons and magic to offset their weakness in hand-to-hand fighting. (The changeling is not a race, but rather an amalgam of all three.) Each commander can recruit members of the same race more economically, and also gets a combat bonus for defending on certain types of terrain. Humans are stronger in towns, elves in woods, and dwarves in hills.

The playfield is a non-scrolling terrain map with home towers in each of the four corners. Each army's forces are represented by a special symbol: globes (Balt), crown (Grum), lion (Aura), and eye (Dred).

The graphics get the job done, but they could have looked a little better on the screen. Avalon Hill has obviously striven to avoid the look of a wargame map, but some military tidiness would have improved the appearance of the main display.

*Darkhorn* can be enjoyed as a one-map battle or an eight-map campaign. The program comes with one complete set of eight playfields, but a special module generates new maps. The gamer can save these customized battle-






*Strategy is the strength of* Darkhorn.
*READER SERVICE NO. 282*

fields to disk.

Each army symbol stands for a party of warriors. An oversized symbol indicates that the commander of the army can use the joystick or keyboard to convey orders to that specific party. The "switch" command shifts control to another party, and the symbols change size to reflect this.

There is an information box for each army below the map. It shows the composition of the active party and presents the command choices. These allow an army to move, split a party into smaller ones, fortify a position, or recruit more soldiers.

*Darkhorn* incorporates two combat systems. Players can either put the battle in the hands of the computer or fight it out, encounter by encounter.

The combat system is very simple. The computerist aims high or low and chooses the instant to thrust. The first blow frequently decides the issue. Since the side-perspective graphics are not especially exciting, many players may prefer to put the battles on automatic and concentrate on the intricate interplay of strategic elements at the core of *Darkhorn*.

And make no mistake, the strategy is the main strength of *Darkhorn*. It won't dazzle players with incredible audiovisual effects, but this multiplayer contest has the power to challenge and stimulate. *Darkhorn* is solid family entertainment.

The Avalon Hill Game Co., 4517 Harford Rd., Baltimore, MD 21214 (phone: 301-254-9200) *–Arnie Katz*

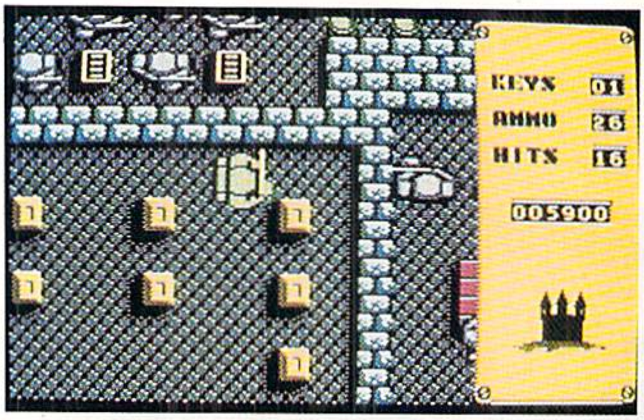
## INTO THE EAGLE'S NEST

**Mindscape**
**Commodore 64**
**Disk; $29.95**

Military intelligence reports that the Germans have massed six divisions in the mighty fortress known as Eagle's Nest. Saboteurs assigned to penetrate this stronghold have not returned, and your superiors fear a Nazi counter-offensive. Your mission: Rescue the captives, blow up the fortress with hidden caches of explosives, and save as many stolen art objects as possible.

*Into the Eagle's Nest* takes place in a four-level fortress which is displayed in overhead perspective. Each level is a multiscreen room-maze filled with chests, art objects, piles of ammunition, and a seemingly endless supply of German soldiers and officers.

The graphics are excellent. The muzzle of the hero's chopper blazes on each shot, a nice bit of visual feedback. It's too bad that the German soldiers aren't similarly animated, because it is




***Into the Eagle's Nest*** *takes place in a four-level fortress which is displayed in overhead perspective. Each level consists of a multi-screen room/maze.* ***READER SERVICE NO. 283***

sometimes hard to tell when a German is shooting at the hero.

The program warns the gamer that the hero has received too much damage. The drawing of the character flashes when the total number of hits exceeds 40.

The sounds give *Into the Eagle's Nest* an aura of substance and solidity. The crack of the commando's weapon and the echo of booted feet clomping down passageways are especially effective.

A scoreboard occupies the right-hand quarter of the screen. It monitors the player's inventory of keys and ammunition, tracks the score, and shows how many "hits" of damage the character has taken.

The joystick controls the movement of the onscreen commando. Pressing the action button fires the hero's machine gun. It's important to shoot carefully, because a saboteur can only carry 99 rounds at a time, and ammo dumps aren't always located in the most convenient places.

The action is reminiscent of the classic *Castle Wolfenstein* by Silas Warner. The commando stalks from room to room, blowing away enemy soldiers who get in the way. Treasures, either lying carelessly on the floor or hidden in chests, increase the computerist's score.

The artificial intelligence behind the German soldiers is primitive. They move in straight lines and always turn 90 degrees when they change direction. They rush the hero without regard for their own safety. They often line up for the slaughter like so many ducks in a shooting gallery.

The German troops make up in numbers what they lack in smarts. The program even "cheats" a little by creating new foes during the course of play, so cleaning out an area is no guarantee that the hero won't get ambushed the next time he goes there.

Some chests contain explosives but the commando must shoot off the lock to examine the contents. Unfortunately, the explosives detonate with lethal effect if the hero blasts one from close range.

Medical kits and cold food heal the hero, reducing the total of accumulated hits. Attacking from semi-protected positions reduces the damage from German fire, but those hits mount up fast.

A vanity board ranks players according to score. The original British version of *Into the Eagle's Nest* must have been programmed for tape, because the high scores vanish once the player turns off the computer. Surely Mindscape could have removed this needless limitation for the US disk version.

*Into the Eagle's Nest* is one of the finest shoot-em-ups published for the Commodore 64 in a long time. It's a "boot and bash" extravaganza which delivers riveting nonstop action.

Mindscape, Inc., 3444 Dundee Rd., Northbrook, IL 60062 (phone: 312-480-7667). *–Arnie Katz*

## CAPTAIN ZAPP
**Mastertronic**
**Commodore 64**
**Disk; $9.99**

An evil genius named Targ wants to destroy the Earth. To this end, he has equipped his very own jungle planet, complete with a hidden fortress, robot guards and, of course, a supply of "planet-killer missiles" which he is going to launch in 24 hours right at us. Of course, Targ could just launch the darn things and be done with it, but




***A distinctly British action/adventure.* READER SERVICE NO. 284**

noooo, he has to gloat about it. This gives Earth a chance to send its primo superhero, Captain Zapp, on a desperate one-man mission to Save The World.

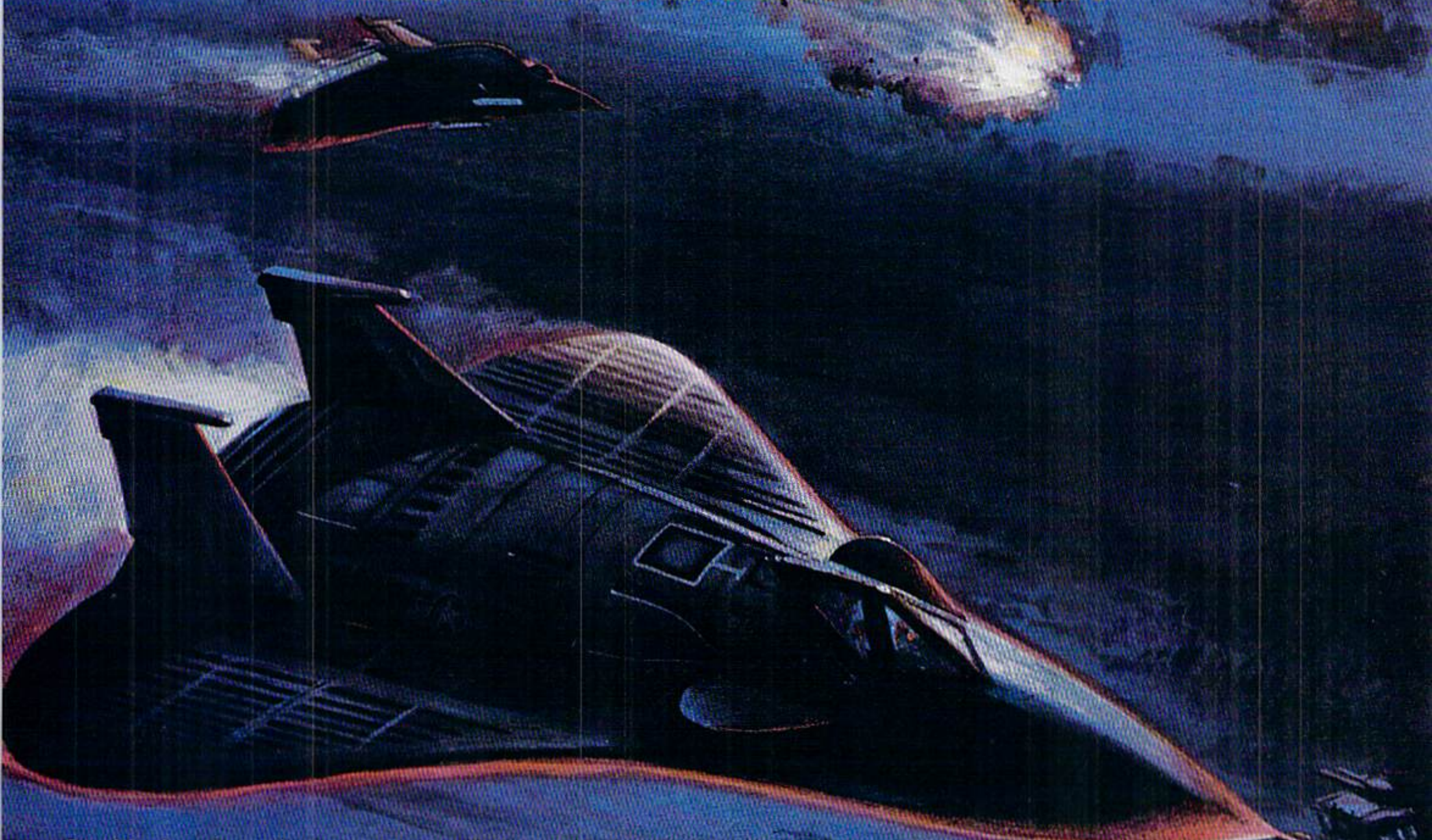
This is the comic book plot which drives the rousing (and distinctly British) action-adventure, *Captain Zapp.* The player controls the good Captain, whose spacecraft has crash-landed on Targ's primeval planet stronghold and who now finds himself on foot traversing a hostile environment. The player uses a joystick to make Zapp walk, fire his weapon, duck, jump, kick, and punch. At crossroads, he can be oriented to north or south.

The Captain's handgun holds only 12 rounds, but Targ has stashed caches of bullets all over the planet. In the initial scenario, Captain Zapp explores the planet in search of Prince Goram's cave kingdom. Surviving that long takes some skill and practice; hostile natives leap from trees, killer spiders and other insects drop from vines, and death-dealing ducks wobble through the skies while great pits and chasms threaten to swallow up reckless wayfarers.

Once Zapp locates Goram, he must persuade the leader of the cave people to provide him with transportation and directions to Targ's headquarters. Gor-

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am, however, isn't impressed by anything but physical prowess; it takes a kung fu battle royal for Zapp to prove his worthiness.

Finally, the Captain must board one of Goram's motorcyclelike vehicles and take on Targ's robot guardians in an attempt to breach the villain's sanctum and short-circuit the killer missiles.

The first scenario, on the surface of Targ's world, is handled through a side view display dominating the top half of the screen, with a map, bullet-counter, and clock along the bottom. The timer counts off the 24 hours remaining before Targ pushes the panic button. If Zapp gets zapped, he has the power to reconstitute himself, but the process uses up precious moments, and once the 24 hours elapse, so does the game.

The second scenario, a martial arts combat with the cave people, also uses a side perspective, with a power meter displayed at the base of the screen. The final game-within-a-game switches to a first-person perspective. At the bottom of the screen, Captain Zapp's gloved hands can be seen gripping the handlebars of his vehicle. The rest of the screen displays, from the Captain's point of view, the chessboard landscape of Targ's dominion and the robotic winged attackers that protect it.

The graphics are sometimes a little muddy, and the play mechanics are a trifle hoary, but *Captain Zapp* is still a delight. The game's spirited design and comic book epic plot invest it with a compelling quality that holds up even after extensive play.

As usual with Mastertronic products, the packaging is marginal; documentation is slim and the cover artwork is borrowed from old Alex Raymond "Flash Gordon" work. But don't judge this book by its cover; there's a great piece of budget-priced software inside!

Mastertronic, Mesa Business Center, Unit 9G, 711 West 17th St., Costa Mesa, CA 92627 (phone: 714-631-1001).

*—Bill Kunkel*

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# RAMCO

## For the C-64 and C-128

### By Buck Childress

Is that ol' disk drive error light flashing again? It sure is! I know I gave the proper command...or did I? Now my curiosity is at a peak. My drive head is in alignment and the unit passed a performance test not more than a week ago. I'm doing everything according to Hoyle, so why do I seem to be having more light shows than usual? The drive has been on for about 10 straight hours. Could the heat be melting the drive RAM? I don't know. The instruction book doesn't have a "Drive RAM Meltdown" chapter. Is my RAM turning to jam after the drive has been on for awhile? Let's check it out.

*RAMCO* is great for the job. It'll search for any puddles of jelly-goo that once were drive RAM. *RAMCO* tests both the 1541 and 1571 disk drives. There's a version for the C-64 and C-128.

*RAMCO* tests five RAM buffers in the disk drives. These buffers are where data is held when you tell your drive to do something. They're similar to the way your computer holds a program in its memory. Validate is a good example. When you validate a disk, the information that eventually makes up your new BAM (block allocation map) is stored in one of the buffer areas, so that any necessary changes can be made before the information is written back to the disk. The drive uses the RAM buffers for a lot of other goodies as well. If you access the drive directly (for random access files, etc.), these areas are vital to the successful completion of your attempted missions. The RAM buffers have to be in tip-top shape. If you're like me, you want to know that everything is working A-OK. So, let's check it out.

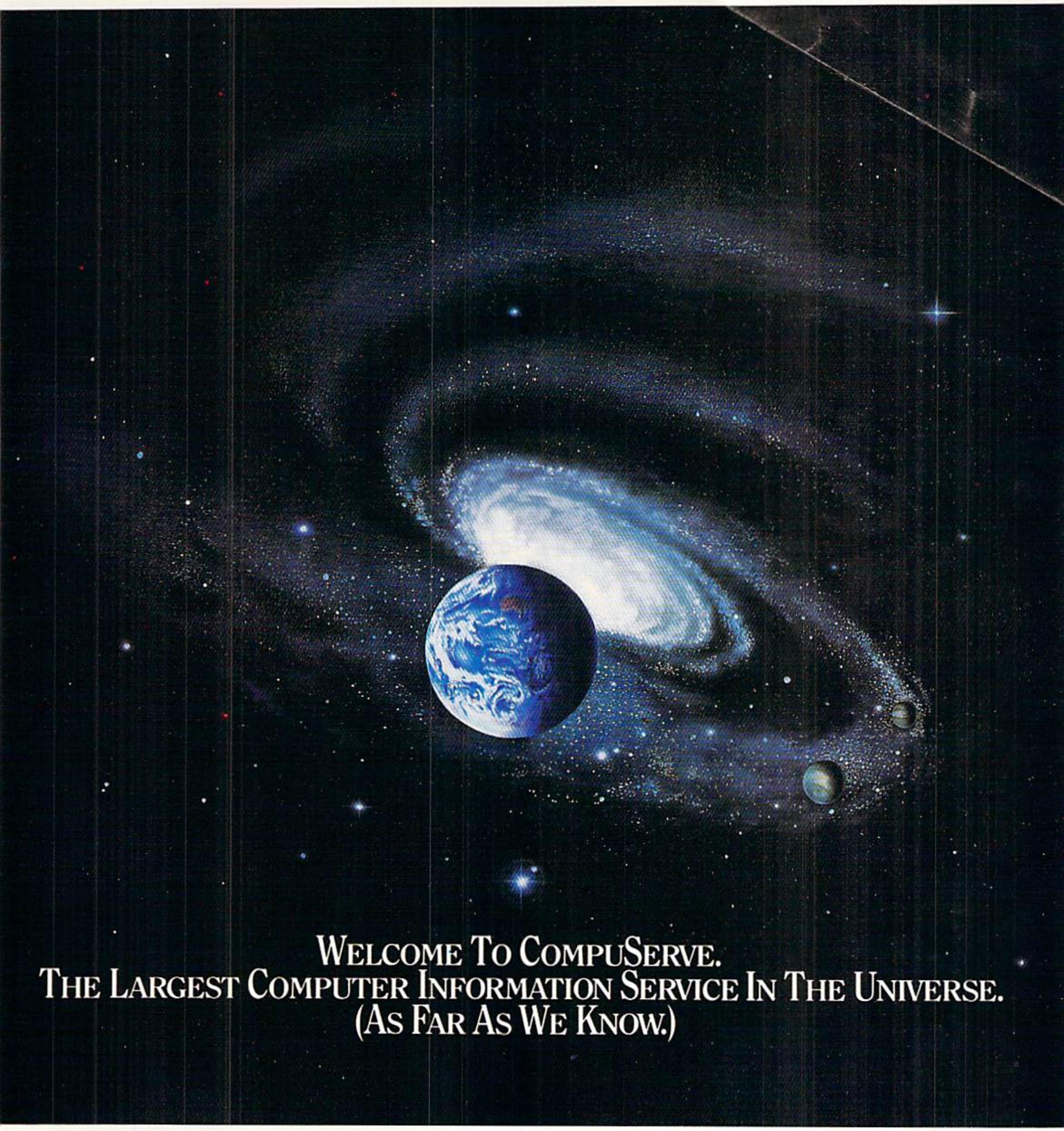
*RAMCO* works by attempting to store various values in each memory location. If a given location successfully holds the value placed there, *RAMCO* moves to the next location. The RAM buffer area currently being checked is displayed and, if all locations in that area are fine, you'll see "OK." Should some jelly-goo be encountered, "ERROR" is reported. In either case, *RAMCO* then moves to the next RAM buffer to be checked. When all five RAM buffers have been given a thorough exam, the test is over. The whole process takes about 20 minutes. While running, *RAMCO* gives a video display of the values being stored in each memory location. It also displays the current location within the buffer being tested.

After you've entered and saved a copy of *RAMCO*, run it. The loader POKEs the data into memory and checks for errors. If all is well, type SYS 49152 for the C-64, or SYS 4864 for the C-128, and press RETURN. *RAMCO* will begin hunting for jelly-goos. (Hopefully it won't find any!) If for some reason, you want to stop *RAMCO* before it's completed the task, the STOP key will bring it to a halt.

By the way, it doesn't matter which drive is connected to what computer. Whether your C-128 is connected to a 1571 or a 1541, or your C-64 is hooked to a 1541 or 1571, *RAMCO* doesn't care. It just wants to make sure your drive isn't afflicted with meltdown. If you happen to be using a C-128, be sure your monitor is in the 40 column display. After the check is completed, be sure to turn your computer and drive off, then back on before running any other program.

Both my 1571 and 1541 drives are fine. I'm confident yours will be, too. But, won't it be nice to know for sure?

In case you're wondering about my light show...for some strange reason, when I finally remembered to format a new disk I was attempting to use, the light flashed no more. Imagine that! ☐ *SEE PROGRAM LISTING ON PAGE 108*




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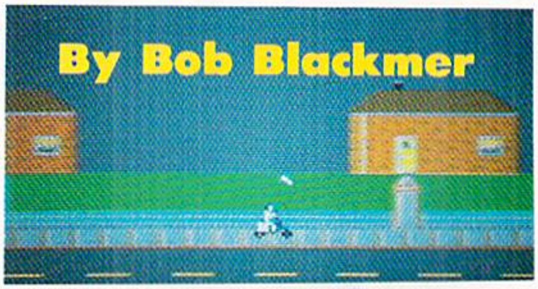
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# PAPER ROUTE

## Extra! Extra! Read All About It! Newspaper Delivery Simulation for the C-64!




*Paper Route* is an arcade game for the C-64 that features sprite animation, smooth scrolling, and a music score. The object of the game is to deliver as many newspapers as you can while keeping customer complaints to a minimum.

As the game begins, you will start to pedal your bicycle down the sidewalk. Using your judgment as to the right moment, press the fire button of a joystick plugged in Port 2 to take a paper out of your bag and flip it toward your customer's porch. This wouldn't be too difficult after awhile, as one could learn the exact spot to be in to flip the paper. However, it seems the only option homebuyers in this subdivision had was the placement of their front entrance. You must concentrate as a house comes into view to pick the right spot to flip the paper, based on the location of the porch.

There are six houses on each block, and since you don't carry any "extras," the program allots you six newspapers per block. If you miss the customer's porch or don't deliver a newspaper, a complaint will be lodged against you. As each block ends, the number of blocks completed and total complaints will scroll by on the screen. If you have a dozen or more complaints, you will be relieved of your paper route and the game will end.

These are tough customers, and they show little patience if their paper isn't on the porch. The only time I found them forgiving for missing a porch was when the paper landed next to the porch on the side the door opens.

*Paper Route* is written entirely in machine language and must be entered using *Flankspeed* (see page 95). After typing in and saving *Paper Route*, reset the computer and LOAD "PAPER ROUTE",8,1. Then SYS 49152 to start. ☐

*SEE PROGRAM LISTING ON PAGE 105*

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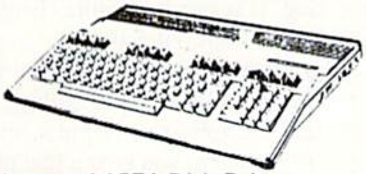
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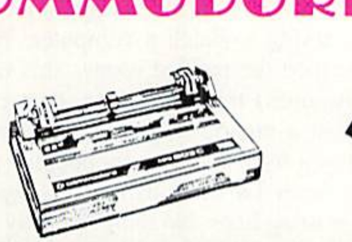
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# LINE SENTRY

## For the C-64

### By Buck Childress

Excuse me while I scream like a wounded banshee. I'll be with you in a moment, just as soon as these men in their white suits take that oversized butterfly net off me...there, that's better. Well, I suppose an explanation is in order.

While working on my latest program, I decided to do a little editing. I changed this and that, line after line, number after number. The results were a bit frustrating, to say the least. It seems that while changing things around, I disintegrated some vital lines.

You know how it goes. If you already have line 100 in your program and, while editing, you inadvertently enter another line 100, your original line goes up in smoke. Or, without thinking, you type a line number by itself and press RETURN. Poof! Zapped like a fly on a frog's tongue.

After being engaged in a programming session that was plagued by these afflictions, I must have been acting in a peculiar manner. All I remember is the strange men with the net mentioning something about me sitting on a bird's nest, in a nearby tree, trying to hatch a computer. What the heck! At least I escaped the padded room...this time. And, I decided there wouldn't be a next time. I'd protect me from myself. I'd post a guard. I'd enlist *Line Sentry.*

*Line Sentry* prevents you from accidentally popping program lines into Never-Never Land. It also guards against inadvertent changes to existing lines. No more butterfly nets to dodge! Let's check it out.

After you've saved a copy of *Line Sentry,* run it. The loader POKEs the machine language data into memory and checks for errors. When the data is through loading, you can activate it. Type SYS 52000 and press RETURN. The line checking mode will become active at the same time. You deactivate it the same way, with SYS 52000. The line checking mode will deactivate at this time, also.

Here's something important, and handy, to remember. When *Line Sentry* is active, you can switch the line checking mode on and off with the touch of a key. Press the O key, then RETURN, to switch it on. Pressing the Q key, followed by RETURN, switches it off. *Line Sentry* tells you if it's on or off. You can do this as often as you like. It's a quick and easy way to activate and deactivate the check mode without having to SYS 52000 all the time.

*Line Sentry* monitors your line entries. Whenever you enter a program line and press RETURN, *Line Sentry* checks to see if your program contains a line with the same number. If it does, *Line Sentry* gives you a chance to retreat before the new line is entered. This also keeps you from accidentally eliminating a line by typing a number, by itself, and pressing RETURN. If you feel a retreat is in order, press the N key. To go ahead with the change, press the Y key.

Just think, no more ranting and raving because you've just hurled an important line into the Twilight Zone. No more men in their funny white suits and weird butterfly nets. What a life!

Don't let forgetfulness infiltrate your programming sessions. Let *Line Sentry* pull guard duty on your programs! ☐

*SEE PROGRAM LISTING ON PAGE 112*

## SUPER DISK UTILITIES

**for the C128 & 1571**



Super Disk Utilities is the ultimate utilities disk for the 1571 disk drive and C128 computer. Super Disk Utilities is a full featured disk utility system that will perform virtually every CBM DOS function available. No need for numerous utility disks to perform various functions. SDU does it all!

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- Terminal emulation capability includes Tektronix -4010 graphics protocol
- Alarm Clock/Timer
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- DOS Command menus, file copy utility
- Written 100% in assembly language
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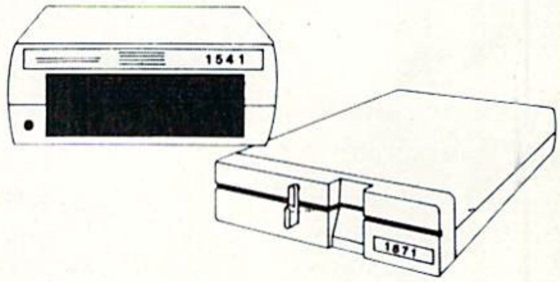
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Why type in the listings in this month's *Ahoy!* when we've done it for you? All the programs in this issue are available on the current *Ahoy! Disk* for $8.95. Isn't your time worth more than that?

Use the coupon at the bottom of this page to order disks for individual months, a disk subscription, or the special anthology disks described below. (You can also subscribe to the *Ahoy! Disk Magazine*—disk and magazine packaged together at a special reduced rate. See the card bound between pages 66 and 67.)

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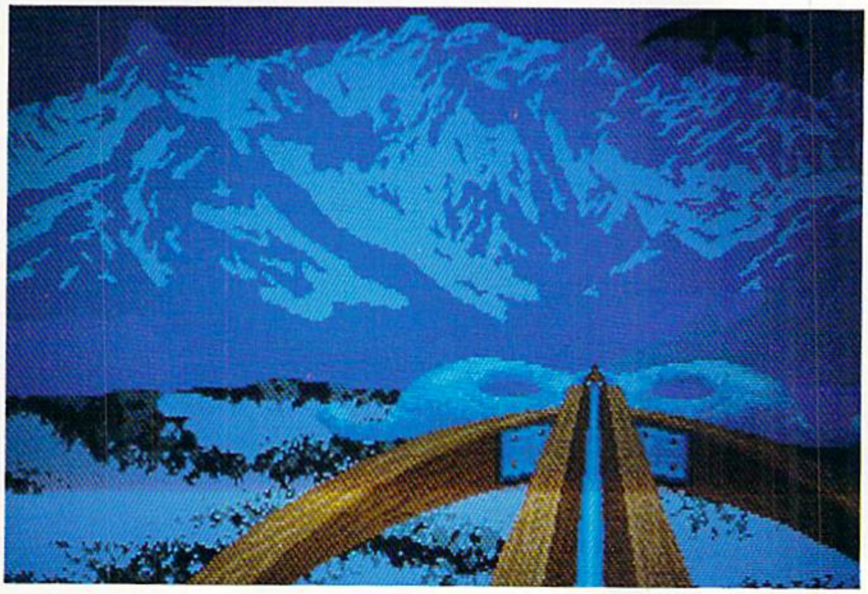
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## SINBAD AND THE THRONE OF THE FALCON

**Cinemaware/Mindscape**
**Amiga (512K)**
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Don the garments and pick up the sword of mythology's most famous sailor. Dastardly plots are afoot, and evil deeds have been done–it will take a hero to set the world back to rights!

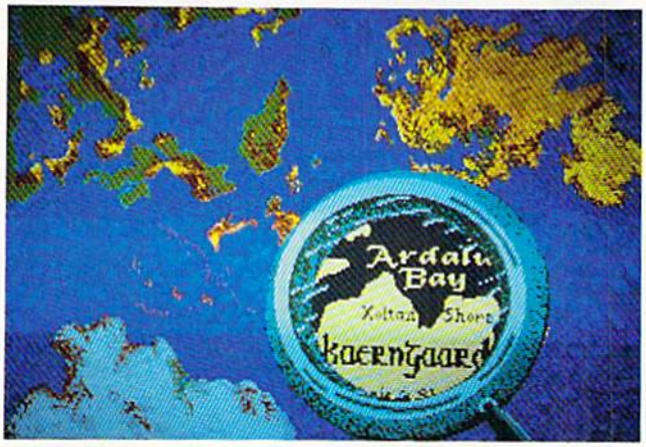
*Sinbad and The Throne of the Falcon* brings characters of legend to life. As the heroic mariner, the computerist moves through a colorful world filled with dream (or nightmare!) characters. There's a kingdom to be saved, a mysterious spell to be removed, gorgeous gals, a hag, a prince, pirates, slaves, and a menagerie of beasts such as are seldom seen outside of Harryhausen's animation studios.

*Sinbad* follows the pattern established by Cinemaware Productions' first software adventure, *Defender of the Crown.* The game by Bill Williams provides spectacular graphics as the background for a sweeping adventure. As Sinbad, the computerist sails through the ancient seas and explores the islands and continents in a search for information and help.

Times are tough in the kingdom of the Caliph. When the Princess Sylphani entered her father's room, instead of her papa, she found only a falcon. Although none of the court physicians or wise men can say how or why, they do know that the falcon is the ruler, transformed into his frail form by a conjurer's spell.

The court magicians try to reverse the spell, but there's no help for it–the king's a crow, and they can't change him back. In fact, they judge that if the spell isn't neutralized soon, the ruler will be stuck forever in his flighty form.

There's not a lot of hope until Sylphani summons Sinbad, her childhood sweetheart. Although the sailor hasn't seen her since she was a knock-kneed preteen, he responds to her call and sets sail for Damaron, capital city of the Caliph's kingdom.




***By use of pull-down menus, Sinbad can converse with other characters, view maps of the city and the world, or travel to other towns, islands, and continents.***
***READER SERVICE NO. 288***

The computerist joins the fray when Sinbad reaches Damaron. As Sinbad, the player must question every person, sail every sea, and explore each island and continent in a search for the solution. On his journeys, Sinbad will meet a host of characters, both human and monster. He'll battle with sword, sling, and bow, cope with shipwrecks, landslides, and various other disasters, and coax secrets out of characters as he seeks clues to the mystery.

The screen opens with a view of a giant hourglass. When Sinbad starts his journey, sand begins to slide through the glass. When all the sand has passed to the lower chamber, time runs out, and the Caliph's fate is sealed forever.

Pull-down menus across the top of the screen provide Sinbad with his options. He can talk to anyone who is present; when the game commences, the prince and princess are his only companions. As he questions each of them, he picks up a few hints of what to do next.

Sinbad can look at a map of the City. This shows the area surrounding the

CINEMAWARE

PRESENTS

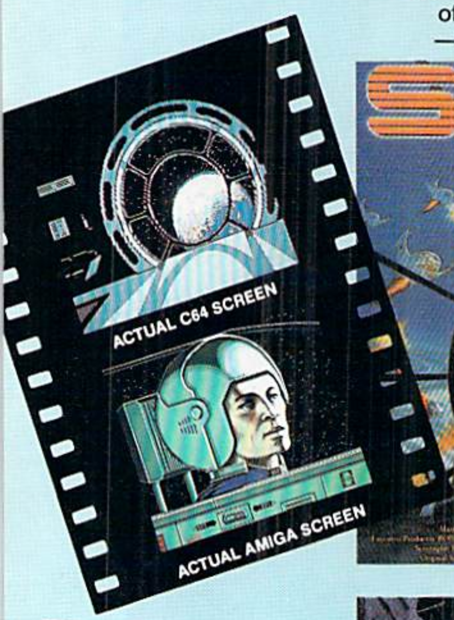
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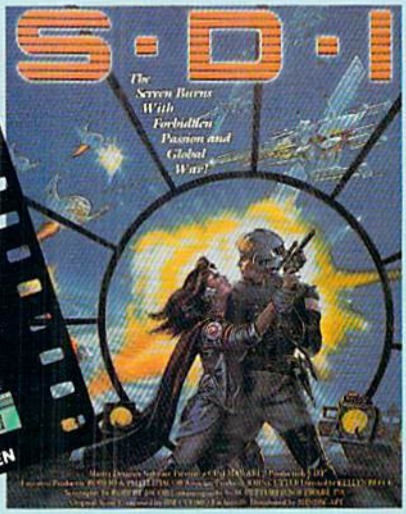
Best Graphics: 16 Bit Division.—*The Software Publishers Association, 1986*

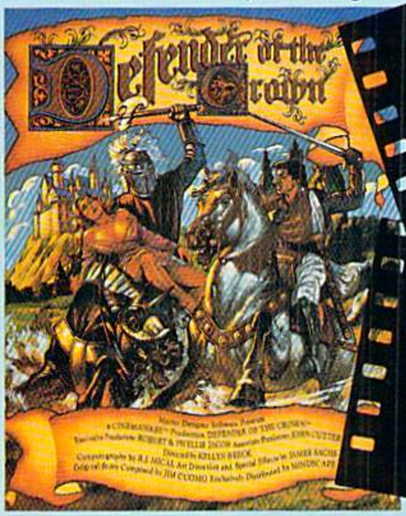
Award For Special Artistic Achievement In A Computer Game.
—*Computer Gaming World, 1987*

Stunning graphics, life-like animation, and a good soundtrack add to the feeling of a movie-like story…
—*Computer Entertainer*

Defender (of the Crown) is the most detailed, most graphically brilliant, most beautiful software program ever released for any microcomputer.
—*The Guide to Computer Living*



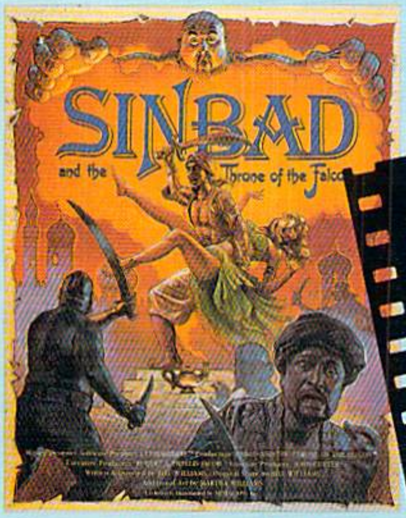


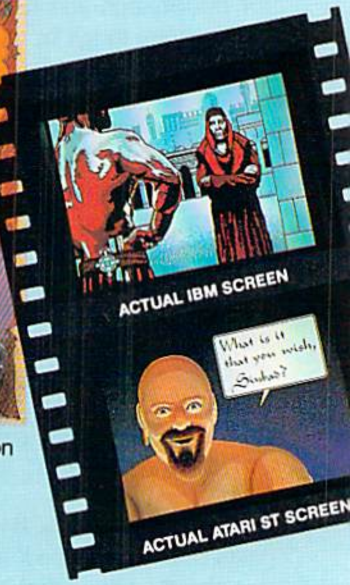











Our choice for the most innovative software product of 1986…with graphics that make your computer into a home movie theater.
—*Chicago Tribune*

Sinbad and the Throne of the Falcon is a brilliant tribute to those masterful films…I've never seen anything like it.
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Reader Service No. 296

palace and keeps track of troop movement in the area. The Caliph's army surrounds the kingdom. As enemy kingdoms learn of the Caliph's condition, they try to take advantage of the situation by attacking. Their armies appear on the hexagonal map, and the Caliph's defenders must receive combat orders. The armchair general directs the troops, moving armies one hex block at a time. Army units can move over all types of terrain, including water, but their mobility ratings change according to the terrain. Combat occurs when two units occupy the same hex block, then continues until one army is destroyed or either army moves out of the block.

The second map shows the entire world, with Sinbad's location marked. A closeup lens operates just like a magnifying glass. Holding down the left mouse button superimposes the lens over the map, so he can read the names of the towns, islands, seas, and other information needed to travel around the world.

When Sinbad is looking at the hourglass, he can converse with any persons at that location. The Talk To menu highlights the names of the people present. Sinbad clicks on the name and the scene changes to a closeup of the location, with the person pictured against the exotic background. Conversations are conducted with the mouse. The character makes a remark, depicted in a comic book style word balloon. Then Sinbad chooses his answer from a menu of comments and clicks on the one he wants to say.

Each character must be handled differently. For example, the Princess Sylphani has a crush on Sinbad, so she tries real hard to come up with answers, no matter what he says. The prince is less intrigued by Sinbad; if the gamer makes remarks that the prince thinks betray a cavalier attitude toward the kingdom's jeopardy, he'll be cranky and unresponsive. If Sinbad treats the situation with appropriate seriousness, the prince will pass on some valuable insights.

The characters that Sinbad meets are a lot of fun. Perhaps the most intriguing is Libitina. This sensational temptress can endow Sinbad with strength if he gains her favor. But she's a temperamental type. If Sinbad approaches her the wrong way, and fails to respond to her sultry come-ons, she'll be angry and unhelpful. This is a major loss to the sailor. Not only does the lady have the ability to make him stronger, but she also is uncommonly fond of Sinbad, whom she has known since he was a boy. Old and somewhat senile, the Gypsy has to be cozened and coaxed to tell Sinbad what she knows.

The final pull-down menu lets Sinbad move to adjoining towns, islands, or continents, or embark on sea voyages. Clicking on the location name changes the scene. If Sinbad goes to a location where there is no one, an onscreen message advises that he found the island deserted, so he can sail on. If one of the monsters or persons or objects are present, that location is pictured with the encounter, for Sinbad's interaction.

The encounters may be beneficial. Sinbad may bump into one of the benevolent characters, like the Gypsy, the Shaman, or the Genie. However, it's even more likely that he'll run into enemies—there are a lot of enemies in this game! If so, the screen prompts the gamer to "pick up thy joystick" and an action game must be won before the adventure continues.

Like the previous Cinemaware release, *Sinbad* contains a number of joystick-operated games. When Sinbad encounters one of his human opponents, his joystick controls a sword through four moves, to deliver a high swipe, normal thrust, or low lunge, or to guard self. Each opponent has his own technique, and Sinbad must tailor his methods appropriately. The fights are difficult and bloody. Most likely Sinbad will lose his life several times before the gamer gets the hang of it. One thing that helps is Libitina's favors. If the seductress has endowed Sinbad with extra strength, he'll do a lot better in the battles.

When Sinbad encounters the nasty Pteranoxos bird, the joystick controls a bow. The fowl bird is actually a spy, working for the Black Prince. If the bird flies away, the Prince will be told Sinbad's current location. In no time, this deadly adversary will be there, sword in hand, to try to kill the hero.

The cyclops can only be killed with the sling, and the joystick directs the stone. This is a difficult skill to master; it's hard to judge the precise moment to loose the stone that crushes the cyclops. Unfortunately, the monster has a sling also—and he doesn't have any trouble at all learning to hurl stones!

The game is stuffed with monsters, seawrecks, disasters, and strategic possibilities. As Sinbad travels over sea and land, he gradually gains information that may lead to the eventual solution to the kingdom's plight. But he'll have to learn a great deal, and master the fighting techniques, or he'll never stand a chance against the denizens of this mythological land.

The superb graphics turn the game into something special. The action contests are a lot of fun, difficult enough to be a challenge, but easy enough that everyone should be able to master them. The conversational game is intriguing. Each character has a good sized body of information, and the gamer can chat with them over and over before all the data is extracted. Perhaps the best of all is the strategic game that

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overlays the entire adventure. If Sinbad ignores the battle raging for control of Damaron, he can lose the entire kingdom, no matter how well he does with his seafaring, sword-swinging adventures.

*Sinbad and The Throne of the Falcon* is a superior game that Amiga owners will delight in demonstrating to their envious friends. Like its predecessor, *Defender of the Crown,* it shows the computer to absolute best advantage. But even more, it contains so much gameplay and strategic interest that the computerist will want to play it many times as Sinbad explores his world.

Cinemaware/Mindscape, 3444 Dundee Road, Northbrook, IL 60062 (phone: 312-480-7667).

*–Joyce Worley*

### SCULPT 3-D
**Byte by Byte**
**Price: $99.95**

I've just been on the edge. And on the inside looking out. No, this isn't Dear Abby. It's a coffee cup. A three-dimensional coffee cup that you can view from any angle–complete with variable light source and shadows.

This cup is one of the simpler models included with Eric Graham's *Sculpt 3-D.* More than a paint program and different from a CAD system, *Sculpt 3-D* is described as "an interactive solid modeling editor, combined with ray tracing software to generate full color images."

Like any hacker worth his salt, the first thing I wanted to do was load some samples to see how clever this program really is. I wasn't disappointed. And that was before I had even touched the manual.

Four of the five images shown on the package are on the disk–a head right out of "THX-1138," an F-15, a rocking chair, and a block of stone partially chiseled into the shape of an Amiga. Each object is shaded, is in perspective, and casts a realistic shadow. Only the front cover, a juggler, is missing. C'mon, guys.

If you have 512K, you may think all you can view are a stick house, a bridge, and a coffee cup. That's because *Sculpt 3-D* hides the really good images off in a drawer named 1Meg. But look there anyway. The images display fine. You just cannot edit or manipulate them in 512K.

While learning to use the program, that's just what you'll do–manipulate existing scenes. To *Sculpt 3-D,* an image is the picture you take of your model, and a scene is a three-way view, a stick drawing, that you create and edit to get the perfect image.

Anyone who took drafting in high school will be comfortable with *Sculpt 3-D.* It starts you off with three two-dimensional views of your object, each in its own window. You simultaneously see your drawing from the front, side, and top.

The borders of each window contain more than a dozen gadgets to help you position your drawing. You can pull back, move closer, center, rotate an object, or move your drawing in any direction you choose.

When you're finished drawing, you'll save the scene you have created. It really is more than just a drawing. In addition to the three views, you will want to include an observer, a target, ground and sky, and what I'll call photographic tricks.

Obviously, you can't just tell *Sculpt 3-D* "Paint me an image of the whizbang I just designed." It would have no idea of what direction or angle to shoot the image from.

So imagine that you can have a tiny photographer (or observer in *Sculpt 3-D's* vernacular) walk around your object. He can find the perfect angle to view the object. Then, like a good photographer, he'll pick the exact direction (target) he wants to aim in order to frame the picture perfectly. And of course he'll position his studio lights (lamps) for the maximum dramatic effect of shading and shadows.

You too will select all these things using the mouse to position the cursor and selecting options from simple pull-down menus. What could take the photographer an hour, you'll do in seconds.

*Sculpt 3-D* simulates a good auto-focus camera, but it also lets you use all the photographer's tricks in creating your image. You can choose the length of your lens, from telephoto to fisheye, select an exposure, even tip your camera at a dizzying angle. You can also control resolution, interlace, number of bit planes, anti-aliasing (to blur jagged edges), and image size.

Image size and mode are especially important as you experiment to get the perfect picture. Five image sizes, from postage stamp to overscan, are avail-

able. Four modes, from two-color, wire frame drawings to 4096-color, ray traced images with shadows, can be selected. A tiny wire frame figure will take only seconds, while an overscanned ray traced masterpiece may be hours in the making (or, more precisely, in the calculating).

**The Rubber Meets the Road**

So far, we've just toyed with *Sculpt 3-D's* sample scenes and images. That's a fun way to spend an evening, but can a regular person actually use this program or do you have to be a mathematician or an artist?

That was certainly my fear. Looking at the sample images, I couldn't imagine myself producing anything so awesome. Not and see the light of day for a year or so. But *Sculpt 3-D* provides you with all the tools you'll need to produce complex images quite painlessly and in relatively short order.

Everything is drawn in triangles. Even a sphere is just a smoothed-over geodesic shape. Each triangle forms a face, for which you can specify color, texture, and smoothness. Color can be selected from any of those the Amiga is capable of producing. Texture controls reflection and glint; choose among dull, shiny, glass, mirror, and luminous. Smoothness can curve a face to blend with each adjacent face. To change any of these characteristics for an existing object, you must reset the menu value, select the faces involved, and edit them from the menu.

Now building 3-D shapes from triangles would be tough—without a good set of tools. And tools are exactly what *Sculpt 3-D* provides. You can crank out sci-fi images in less time than you'd imagine once you learn how to use this program.

*Sculpt 3-D* can automatically create spheres, hemispheres, cones, cylinders (closed ends), tubes (open ends), disks (single round face), and circles (circumference only, no face). Those are the very basics. The Curve option will allow you to build an open or closed curve without triangles.

My all-time favorite is the Spin option. Build a curve, then spin it around an axis for a solid shape. This is great. Or you can Extrude a shape. Just like those Play-Doh factories, you build a curve and push it out into a long tube.

If your shape has two symmetrical sides (like a human head), you can just draw one side, then use Reflect to complete the picture. Reflect produces a mirror image which can be part of, or separate from, your original object.

You can expand or contract any object in 1, 2, or 3 dimensions. You can even grab selected points and pull or push them to shape your object. The Magnet option will attract or repel too, but the points farthest from the magnet won't move as far, so it builds a gradual curve.

For really complicated shapes, try Unslice. Make an imaginary slice through the object you want to draw and reproduce the outline with *Sculpt 3-D.* Take another slice. And another. Stack 'em up and let *Sculpt 3-D* connect them all into a solid three-dimension-

*Continued on page 113*




## For the C-64

### By Tony Brantner



**F***lash Flood* marks the return of Smilin' Stan, first introduced to *Ahoy!* readers as the insect-hunting hero of *Bugout* (January '87).

This time we find Stan spending a peaceful day at home. At least it was peaceful until the storm moved in. Thanks to a leaky roof, water has begun to drip from the ceiling. If the rain continues for very long, the water will seep through the floor, and eventually flood the basement. Armed with only a bucket and two fast feet, can Stan keep his basement dry?

*Flash Flood* is an arcade style game written in machine language for the Commodore 64. After using *Flankspeed* to type in and save a copy of the program, plug a joystick into Port 2 and SYS 49152 to play. The opening screen displays the title above the room, along with a scrolling message to press the fire button. Once the button is pressed, the title is erased, and Stan enters the room from the left side, carrying a bucket overhead. The object of the game is to keep the basement dry by moving Stan back and forth across the room, catching the raindrops that fall from the ceiling.

Each drop is worth 10 points multiplied by the current level, which is shown above the score, and the high score for the session. As an added bonus, the basement is automatically drained every 10,000 points. At the bottom center of the screen is a meter which shows the water level within the bucket. Once the bucket is full, raindrops can no longer be caught. You must empty the bucket by touching the sink on the right side of the room (You don't have to wait for the bucket to fill before emptying it. Actually, your best strategy is to empty it whenever possible).

The game features 20 levels, which range from a light shower to a torrential downpour. Use the SHIFT-LOCK key to freeze the game. Once the basement is flooded, Stan quickly exits the room, and the program returns to the opening screen. □***SEE PROGRAM LISTING ON PAGE 110***

PHOTO: MICHAEL R. DAVILA

# A-MAZE-ING

## For the C-64 and C-128

### By Buck Childress



Mazes...those staunch supporters of computer games. In one form or another, they've been holding up their end of gaming for years. Where would we be without 'em? Kind of like pants without suspenders. They'd be down around our ankles. *Pac-Man* probably never would have gobbled up his dots! Think of the possibilities.

If you like programming maze games, try something *A-Maze-Ing*. (Sorry, I couldn't resist.) *A-Maze-Ing* creates an almost unlimited variety of mazes that you can include in your own games. As a matter of fact, you can append it right to your programs, if you want. There are versions for both the C-64 and C-128 (in 40 column display mode). Here's how to use it.

After you've entered and saved a copy of *A-Maze-Ing*, run it. The loader POKEs the data into memory and checks for errors. Both versions are placed high up in free RAM, in case you have something else you want to POKE down below. If all is well, type SYS 52800 for the C-64 or SYS 6700 for the C-128 and press RETURN. The screen will go blank for a second, then reappear with a maze onboard. *A-Maze-Ing* is meant to be activated from within a program. If you SYS to *A-Maze-Ing* in direct mode (no line number), the screen will scroll in order to print the READ prompt.

As I mentioned earlier, you can append *A-Maze-Ing* right to your own programs. That's why the loaders are kept as short as possible and begin with line 60000. Your programs can GOSUB 60000 to POKE the data into memory. Then they can SYS to *A-Maze-Ing* to activate it and place characters, or whatever, inside the maze it created. It's really simple.

The starting point of each maze is always 1105 in screen RAM, so you could put your dot gobbler, or whatever, there. Since you don't know what shape of maze will pop up at a given time, here's an easy trick to place characters about its confines. Let's say you want a ghost somewhere around its middle, approximately 1524 screen RAM. Just have your program PEEK (1524) to see if it's a blank space (character code 32). If it is...bingo. Place it there. If not, PEEK the general vicinity until you find a vacancy, then make the deposit. You can place all kinds of characters everywhere, from within your program, using this technique.

The walls of the maze are character (CHR$) code 160. So, if you're moving things around, PEEKing for 160 will let you know whether or not you've bopped your pate on a wall.

There's a little five line demonstration program for each version of *A-Maze-Ing* that lets you check out the maze. After you've run the *A-Maze-Ing* loader to get the data into memory, just load and run the demo. Be sure to use the correct version for your computer. You can watch a ball roll endlessly about a maze. The STOP key halts the demo. RUN [RETURN] will restart it, this time with an entirely different maze.

Put your maze programming sessions in high gear with *A-Maze-Ing*. Who knows? With it, and a little ingenuity on your part, you might create the next *Pac-Man*. □

*SEE PROGRAM LISTINGS ON PAGE 104*

PHOTO: MICHAEL R. DAVILA

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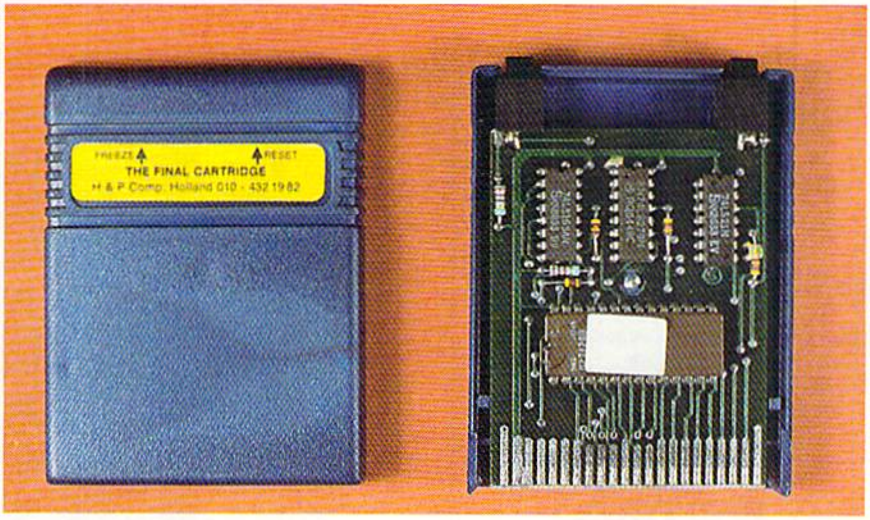
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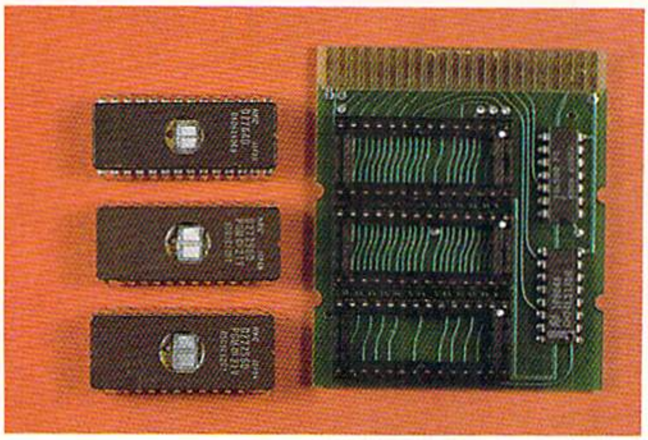
## The Latest Forget-Me-Nots for the C-64

### Text and Photos by Morton Kevelson

It has been over a year and a half since we looked at *Memory Dumpers for the C-64* (March 1986 *Ahoy!*), an interval which is normally considered as half a lifetime for a computer. We are pleased to note that substantial improvements have been made for this type of utility. The latest memory dumpers provide many features in addition to the basic task of snaring the current contents of memory and storing it onto disk.

We suggest that you take a look at the memory dumper reviews in the March 1986 issue, along with the *Isepic* review in the October 1985 issue. The information presented there, along with the current material, will provide an overview of memory dumpers for the C-64 as they have evolved in this country.



***Top:* The Final Cartridge, *with 16K ROM and twin pushbuttons.***
*READER SERVICE NO. 142*

***Bottom:* CPR-3 *board and its three PROMS***
*READER SERVICE NO. 143*

**THE FINAL CARTRIDGE**
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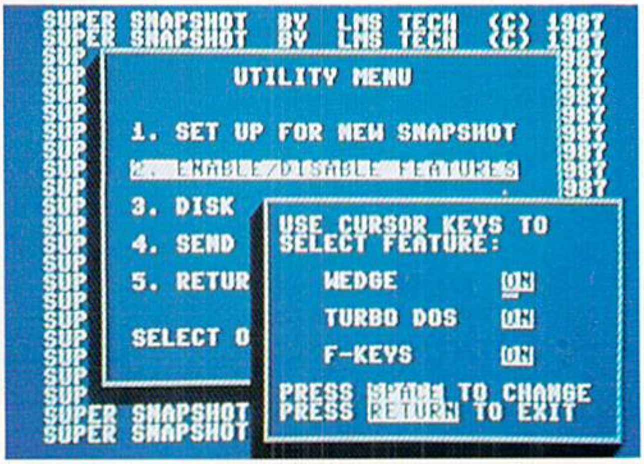
Many sophisticated Commodore products seem to be originating overseas. *The Final Cartridge*, which originates in Holland, is another example of what is being done by the international Commodore community. H & P computers have packed a complete C-64 utility package, in addition to the subject memory dumper, into a standard size C-64 cartridge.

Externally, the presence of paired pushbuttons distinguishes *The Final Cartridge* from the run of the mill program pack. Inside we found a 16 kilobyte PROM and a modest collection of logic and control chips.

The right hand pushbutton simply grounds the C-64's reset line when depressed. This action, sometimes referred to as a cold reset or a hard reset, restores the C-64 to power up conditions. The Reset button comes in handy when the computer crashes for some reason, or if you wish to quickly break out of a program. The primary difference between the Reset button and turning off the computer is that the contents of memory remain for the most part intact. It will generally be possible to retrieve any programs and data which were in memory prior to the reset, if you have the proper tools and skills. *The Final Cartridge* makes it easy to recover BASIC programs by adding an OLD command to the C-64's repertoire.

The left hand pushbutton interrupts the currently running program and accesses the first of several menus which initiate the various functions provided in *The Final Cartridge.* All menu options are selected via the function keys. Two of the selections on the first menu dump the current contents of memory




*With 8K RAM (top) and 32K ROM (bottom),* **Super Snapshot** *has more of its own memory than any other dumper. Below: utility menu, offering supplementary features. READER SERVICE NO. 141*

to disk or tape. The form of the dump is such as to allow the currently running program to be reloaded and restarted at the point of interruption. This of course will get around many forms of copy protection. The presence of complete tape support in *The Final Cartridge* is an indication of its overseas origins. Across the Atlantic, tape is still a major form of mass storage.

Among the options available from Menu.2 is the ability to kill sprite-to-sprite or sprite-to-background detection. Both sprite collision detectors can be disabled, but it will take two cycles through the Freeze menus to do so. Killing collision detection may let you rack up some phenomenal scores with some games, as your playing piece is made immune to enemy fire. It may also immunize the enemy to your own missiles, resulting in a stalemate. Games which do not use sprites will not be affected by this function.

The Run selection on Menu.2 lets you restart a program which was interrupted by the Freeze button. This is the only time and place from which an interrupted program may be restarted after pressing the Freeze button. The Reset selection drops you into the next menu.

The Reset menu lets you restart the computer with *The Final Cartridge* enabled or disabled. There is also an option to jump into a user-defined reset sequence. The built-in machine language monitor may also be entered from the reset menu.

*The Final Cartridge* includes a very powerful machine language monitor (MLM). It is equal to most public domain and commercial machine language monitors, with a similar command format to most of the others. Included is the ability to examine memory in hexadecimal and PETSCII format, a mini assembler and disassembler for writing and examining machine language programs, and the ability to easily direct output to the screen or printer. The memory and disassembly

displays may be scrolled both forward and backward. The usual MLM functions for manipulating the contents of memory by filling, moving, comparing, and hunting are available.

Easy disk access is available while in the monitor via the wedgelike @ command. There is even a simple disk monitor capability where a disk block can be read into the computer's memory, manipulated by the monitor, and written back out. The default disk buffer is the 256 byte block starting at $CF00, but this may be changed.

Additional monitor features include hexadecimal to decimal conversion and the bank switching of the C-64's memory. This last feature let us discover some interesting facts about *The Final Cartridge.* We noticed that when the monitor is active, *The Final Cartridge's* operating system ROM is in the $8000-$BFFF ROM block in the C-64. Thus the BASIC ROM and the 8K of RAM at $8000 are switched out. Using the monitor's bank switching facility we were able to examine the entire contents of RAM in the C-64, including the RAM under the Kernal. However, the ROM structure of *The Final Cartridge* makes it impossible to examine the contents of the BASIC ROM.

We now move back up several paragraphs to the last selection on the first menu. This brings us into the first of two Print menus. The first option lets you manipulate what turns out to be the text and border colors of the text screen. According to the manual, this should have been the foreground and background colors. If a multicolor image is displayed, the border and some of the screen colors may be cycled. If a hi-res image is displayed, color control turns out to be limited to the border and menu text colors while the image colors are not affected. The print menu is left by selecting a normal or reverse screen dump.

The second Print menu lets you reset the printer vectors in case the program has overwritten them, adjust line feed spacing for some IBM compatible printers, and select between a Centronics or Serial port dump. The Serial port dump is for use with a Commodore printer such as the VIC-1515/1525, MPS-801/3, or a dot matrix printer connected via an interface which emulates these Commodore printers. Text screens are dumped as such. Multicolor screens are printed in a pseudo gray scale using printer dot patterns. Hi-res images are sent out as a straight bit map dump. Images are printed in horizontal format. The size of a printout was 8" wide by 5½" high on our Gemini 10X in 1525 mode.

*The Final Cartridge* will drive a Centronics printer directly. To do so you will have to install a cable between the user port and the printer. H & P will provide a suitable cable for $19.95. We used the cable we described on page 65 in the November 1986 *Ahoy!* We found that the Centronics connection worked just fine with text, but we were unable to get a proper screen dump on our aging but still serviceable Gemini 10X. The Centronics dump on *The Final Cartridge* is intended for an Epson or Epson-compatible printer. We guess that our Gemini 10X just isn't Epson-compatible enough. Since the Centronics dump uses the Epson's double density graphics capability of 960 dots per line, as compared to the MPS-801's maximum of 480 dots per line, we expect the quality of the screen dumps to be somewhat better on the Centronics printers.

When the C-64 is first powered up with *The Final Cartridge* in place, there is no indication as to its presence, as the computer displays the usual opening message. It is only when you start working with the computer that the various enhancements become apparent. To start with, program loading times were from two to four times as fast as with an unadorned 1541 disk drive. Save times were also enhanced by a factor of 3 to 5. Actual improvement seemed to be dependent on file size and disk organization.

The C-64's function keys acquire some useful assignments with *The Final Cartridge.* These are summarized in the following table:

| | |
|---|---|
| F1 LIST | F5 DLOAD |
| F2 MONITOR | F6 DSAVE |
| F3 RUN | F7 DOS"$ |
| F4 OLD | F8 DOS |

These commands, which may also be entered directly from the keyboard, are a subset of the programmer's aid commands included with *The Final Cartridge.* The remainder of these commands are as follows:

AUTO—automatic line numbering
DEL—delete a range of lines
RENUM—renumber the program in memory
FIND—locate a text string or keyword
APPEND—program from tape to program in memory
DAPPEND—ditto from disk
HELP—displays offending line after syntax error
DVERIFY—the disk verify against program in memory
KILL—disables *The Final Cartridge*

The RENUM command will work on APPENDed programs, even with overlapping line numbers. However, the RENUM of branching instructions, such as GOTO or GOSUB, may not be what is expected. Be sure to RENUM your programs to compatible line ranges before using APPEND. The DLOAD command performs a non-re-

locating load to the original address from which the file was saved. As the DLOAD command executes it displays the program's start and end addresses.

Since H & P made the point that *The Final Cartridge* "Does NOT use existig memory," we decided to look into the matter. It is true that *The Final Cartridge's* operating system does lie in the external cartridge ROM bank from $8000 to $BFFF. Many of *The Final Cartridge's* operations require the use of system working RAM in page zero or in memory below $400. *The Final Cartridge* does attempt to swap out what it needs and restore what it took out when finished. Since *The Final Cartridge* does not have any onboard RAM, the swap area has to be in free RAM in the computer. Thus, strictly speaking, *The Final Cartridge* must make use of the C-64's existing RAM.

The lack of onboard RAM will limit *The Final Cartridge's* ability to successfully Freeze and save some C-64 programs. All programs are frozen by *The Final Cartridge* with the file names FC and –FC. These may be renamed with more meaningful titles.

Overall we were quite pleased with the operation of *The Final Cartridge*. We encountered no problems when using a C-64 with a 1541 disk drive. With a C-128 and an SX-64 we occasionally encountered a glitch where we had to hit the Reset button to get back the machine. With the C-128 we found that after several resets right after power up, the problems seemed to go away. We also found that *The Final Cartridge* would not work with our 1571 until we installed the disk drive's upgrade ROM. In fact, *The Final Cartridge* would crash with the 1571 even when we were not performing a disk drive operation. With the SX-64 we used the KILL command, which still left us with acces to the Freeze button.

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## SUPER SNAPSHOT

**Computer Mart**
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Once again we find ourselves examining an imported product. In this case it had less of a way to go, as it originated just north of the border. *Super Snapshot* is a product of LMS Technologies up in New Brunswick. It is distributed in the USA by Computer Mart. If you saw our original presentation on memory dumpers, you may recall the review of *Snapshot* or *Clonebuster* which was also made by LMS Technologies. Although *Super Snapshot* is based on that earlier release, it has far more features than the original. As a result we feel that it merits a separate review.

Externally *Super Snapshot* looks like any other C-64 game cartridge. Its only distinguising feature, aside from the label, is a flush mounted pushbutton in the upper lefthand corner. Our sample of *Super Snapshot* also included a miniature toggle switch. This $5 option disables *Super Snapshot* for use with the C-128. Of course this switch makes *Super Snapshot* invisible to the C-64 mode as well.

Inside *Super Snapshot* we found a 32 kilobyte PROM, 8 kilobytes of static RAM, and an even half dozen logic and control chips which glue the works together. The 32 kilobyte PROM is socketed for easy replacement by the user. This opens the way for low cost upgrades of *Super Snapshot*. The 8 kilobyte RAM chip is crucial to the operation of *Super Snapshot*. This RAM provides the essential external storage area for critical data which allows *Super Snapshot* to restart virtually any C-64 program after interruption.

*Super Snapshot* displays its own opening menu when the computer is turned on or reset. This menu may be bypassed by holding down the F7 or F8 key on power up. The former operation brings the computer directly into BASIC with all *Super Snapshot* enhancements in place. The latter operation does the same with *Super Snapshot's* enhancements turned off. Holding down the Commodore key while pressing the *Super Snapshot* button will generate a system reset. The combination of the Control key and the *Super Snapshot* button goes directly to the built-in machine language monitor.

The opening menu provided five options. The first option fills memory with a predetermined pattern and exits to BASIC. The second option is reserved for future expansion. The third option merely displays the *Super Snapshot* version number (2.0 in our sample) and a brief commercial message. The last two options exit to the system with all features on or off. All options are selected via the function keys.

*Super Snapshot* has three more function screens. The first of these is the Sub-System menu which appears when the Super Snapshot button is pressed. At this point you may toggle subsequent *Super Snapshot* disk operations to device 8 or 9. If you choose to snapshot the program, you will be prompted for a program name and identifier. The name is displayed when the snapshot is reloaded. The identifier is used for the snapshot disk files.

The second choice on the Sub-System menu leads to the Screen-Copy menu. The screen which was displayed at the time when the Super Snapshot button was pressed may be now be sent to the printer, and in the case of bit map screens it may also be saved to disk as a *Koala* or *DOODLE!* format file. We

are especially pleased to see the bit map file save option as it was included at our suggestion. Once saved as a *Koala* or *DOODLE!* file, the image may be converted or manipulated by any of several programs or utilities.

The Screen-Copy menu offers a choice of three printers: the 1525, 1526, or Epson-compatible. The 1525 and Epson dumps are vertically oriented, which allows for a larger dump and better defined dot patterns for a higher contrast gray scale. We did not try the 1526 dump. Selecting the 1526 generates a warning message which includes the length of time it will take to do the dump. This could be as long as 35 minutes. For the C-128 you have the option of running the dump in 2.0 MHz mode, which may speed things up a bit for all printers. Three dump sizes are provided. All graphics are printed in gray scale except for the small size hi-res dump which uses a straight bit map representation.

The medium and large sized dumps in 1525 mode were the same width but of different lengths. The proportion of the dump will depend on the printer you are using. On a 1525 the medium sized dump was nearly square, while the large sized dump was properly proportioned. On the Gemini 10X in 1525 mode, the medium sized dump was properly proportioned and the large sized dump was elongated.

Using the Gemini 10X as an Epson compatible, we were able to generate small and medium sized dumps. The large size dump apparently used the Epson's high density print codes which did not work with our Gemini 10X. Size of the multicolor bit map dumps are approximately 4.5 by 3.25", 6.75 by 6.75", and 8.75 by 7.5" for the small, medium, and large on an Epson-compatible printer. The hi-res dumps were about the same for the small size and 9 by 6.75" for the medium size.

Getting back to the Sub-System menu, you may enter the Utility menu. At this point you may set up for a new snapshot or selectively enable or disable the three categories of *Super Snapshot* features. These consist of the Wedge, Turbo DOS, and Function Keys as described below. The Utility Menu also lets you view the disk directory and issue commands to the disk drive.

The built-in machine language monitor is accessed via the Sub-System menu. All standard MLM functions are supported, including alternate output to the screen or printer. Leading zeros may be omitted from all parameters. The only noticeable shortcoming is the lack of scrolling via the cursor keys. A rudimentary track and sector editor is included by reading a single block into RAM which may be modified and written back to the disk. Direct access to the I/O registers is also provided.

The MLM does an excellent job of manipulating the C-64's layered memory. It is possible to examine all of RAM including that under the BASIC ROM, the Kernal ROM, and the Character Generator, as well as under the I/O section. Bank switching is accomplished by manually changing the values in the lower three bits of the C-64's memory address 1. This address is actually an I/O port built into the 6510 microprocessor which is used to control the C-64's memory configuration.

Interestingly enough, we were not able to locate any of the *Super Snapshot's* operating code in the C-64's memory map. We suspect that *Super Snapshot* uses some snappy memory bank and data swapping between the C-64's RAM and its own 8 kilobytes. We found some evidence of this in a very noticeable screen flicker when examining some parts of RAM. This type of flicker is indicative of extensive use of interrupts and bank switching on the C-64.

The last option on the Sub-System menu lets you resume execution of the interrupted program. This is a very powerful tool, as it allows for the examination and manipulation of the computer's memory and the testing of the results. This option is always available following any of *Super Snapshot's* operations, as all the menus exit to the Sub-System menu. We tried the resume option on numerous programs without any problems.

*Super Snapshot* provides a full-featured DOS wedge which includes commands for toggling Turbo DOS, displaying the function keys, and toggling the function keys. Turbo DOS does a fast load at about five times the speed of a 1541. *Super Snapshot* checks the disk drive and turns off Turbo DOS

if it is not compatible. There is also a built-in fast format which prepares a disk in about 30 seconds. The function keys contain the following commands on power up:

F1–loads first program on disk
F2–displays current function keys
F3–disk directory
F4–selective directory
F5–RUN
F6–SAVE
F7–LIST
F8–enter the monitor

The contents of the function keys may be changed at any time.

Not all programs are amenable to the *Super Snapshot* process. For example, software which uses specialized disk drive routines cannot be Snapshot. To get around this problem *Super Snapshot* includes a disk with 40 parameters. These are a sampling of the most popular parameters from the hundreds on the *Kracker Jax* utility disks distributed by Computer Mart.

LMS Technologies has certainly packed a lot into *Super Snapshot*. They appear to be quite serious about supporting their product. The 32K ROM is presently little more than half full and they are planning to install additional functions in the available space. Owners of *Super Snapshot* V1.0 may upgrade their 16 kilobyte ROM by returning the cartridge with a $15 service fee. Future ROM upgrades should cost even less.

Overall we were very pleased with *Super Snapshot*. Its memory dumper function is probably the most advanced on the market at this time.

Computer Mart, 2700 NE Andresen Rd., Vancouver, WA 98661 (phone: 206-695-1393).

**CAPTURE**
**Jason-Ranheim**
**Commodore 64**
**Price: $39.95**

We would be remiss in our duties if we did not mention *Capture* as one of the currently available memory dumpers for the C-64. If nothing else, *Capture* is the only native-born memory grabber at this time. We will be brief as a detailed review was presented in the March 1986 *Ahoy!*

*Capture* is a no-frills memory grabber. It does not contain a machine language monitor or any extensions to BASIC. *Capture's* primary purpose is to interrupt a currently running program and save it to disk, something which it does very well, as it does have its own 8 kilobytes of static RAM as well as an 8 kilobyte operating system on ROM.

A *Captured* program is saved to disk as a series of 2 kilobyte program segments with a separate segment for the I/O section. Each segment is neatly labeled so you can examine the files to find out what is going on. The program disk also contains disk also contains a built-in fast loader for the 1541 disk drive. The fast loader is automatically bypassed on other drives. A supplementary utility is available which combines the files into one for a slightly improved loading time. The *Capture* cartridge works well on both the C-64 and the C-128. The problems we experienced with the earlier samples on the C-128 have been cleared up. *Capture* is normally invisible to the computer until its button is pressed, at which time it takes control of the machine. This means that *Capture* will not force the C-128 to boot up into C-64 mode.

*Capture* does have a unique option: the ability to create an autostart cartridge from a *Captured* program. This feature, which was not yet implemented for our last review, is now fully operational. As an example we have used it to place version 1.2 of GEOS into an autostart cartridge. The program is now available less than two seconds after power on. The most recent versions of GEOS are not amenable to memory grabbers, as they download code to the disk drives. Disk drive code cannot be preserved in a restartable fashion by the memory grabber cartridges at this time. However, *Capture* does provide the option to save the contents of the disk drive's RAM to a disk file for subsequent analysis.

To create an autostart cartridge you will need Jason-Ranheim's Promenade C1 ($99.95) and one or more CPR3 ($29.95) cartridge kits. Jason-Ranheim offers reduced priced sets consisting of *Capture*, Promenade, and CPR3 for $149.95 and an additional CPR3 with a model DR EPROM eraser for $199.95. The Promenade C1 is a versatile PROM programmer which can handle a wide range of PROM types and capacities, including chips as large as 512 kilobits (64 kilobytes). A detailed review of Promenade along with a feature on PROM programming was presented in the July 1985 *Ahoy!*

The CPR3 cartridge kit consists of a standard-sized C-64 cartridge circuit board and a companion plastic case. The board contains three sockets which accept a 2764 (8 kilobyte) core EPROM and two 27256 (32 kilobyte) data EPROMs. Two additional logic chips complete the control circuitry. A set of three EPROMs is also supplied with the CPR3.

Creating a cartridge is not a difficult process. *Capture* and the Promenade should be installed before powering up. Press the Capture button and preconfigure memory before loading and running the application program in the usual fashion. At the appropriate time press the Capture button to interrupt the program and select option 4 on the Capture menu. *Capture* will then prompt you to insert the PROMs in sequence and will proceed to automatically program them. You will have to supply *Capture* with the appropriate control words for your EPROMs. This information is supplied with the CPR-3 kit. The 2764 core EPROM and one of the 27256 data EPROMs will always be required. The second data EPROM will only be used for larger programs.

Since the CPR-3 circuit board is fitted with sockets, it is possible to program additional chip sets and swap them when desired. However, integrated circuit sockets are not really designed for the repeated insertion and removal of the chips. The CPR-B circuit board (a CPR-3 without the chips) is available for $12.95. Keep in mind that PROMs may be damaged by the discharge of static electricity and should be handled accordingly.

We have been keeping an eye on Jason-Ranheim for more than two years, and we are pleased to see a company which has been actively supporting and developing their products. The Promenade and its related applications are a unique and useful series of products.

Jason-Ranheim, 1805 Industrial Drive, Auburn, CA 95603 (phone: 800-421-7731; in CA 800-421-7748; tech support 916-823-3284).

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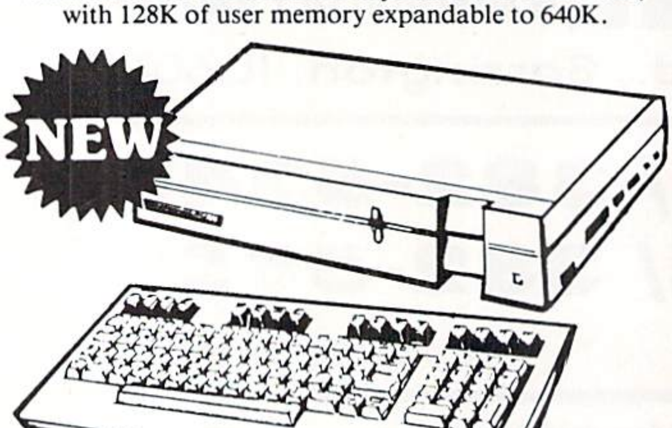

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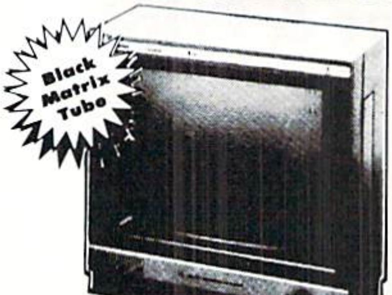
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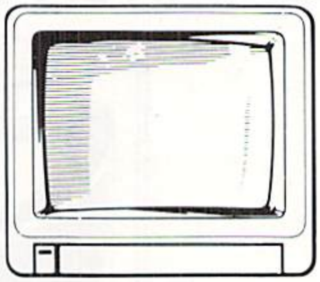
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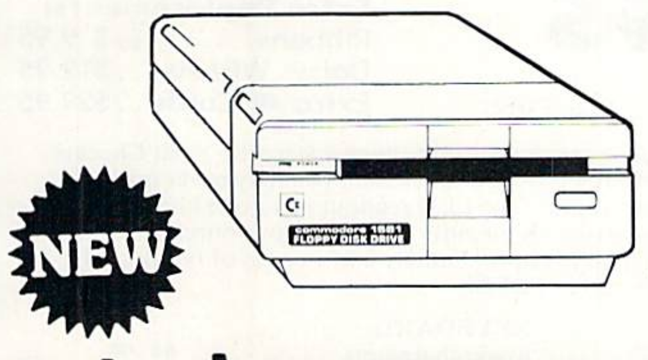

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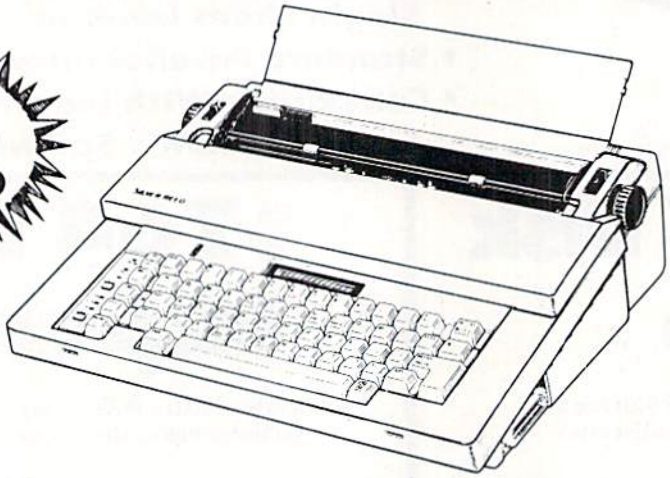
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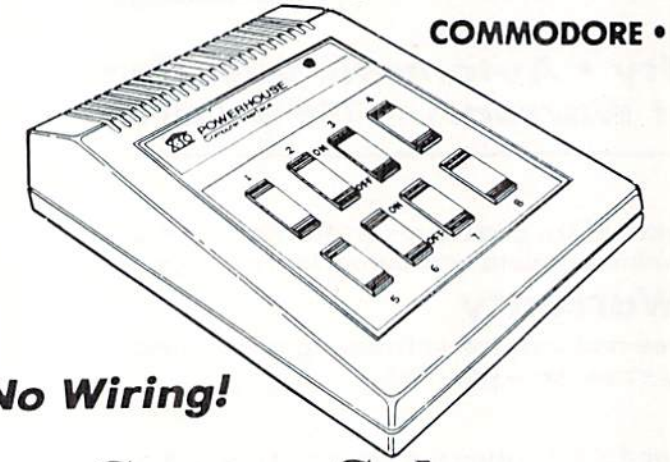
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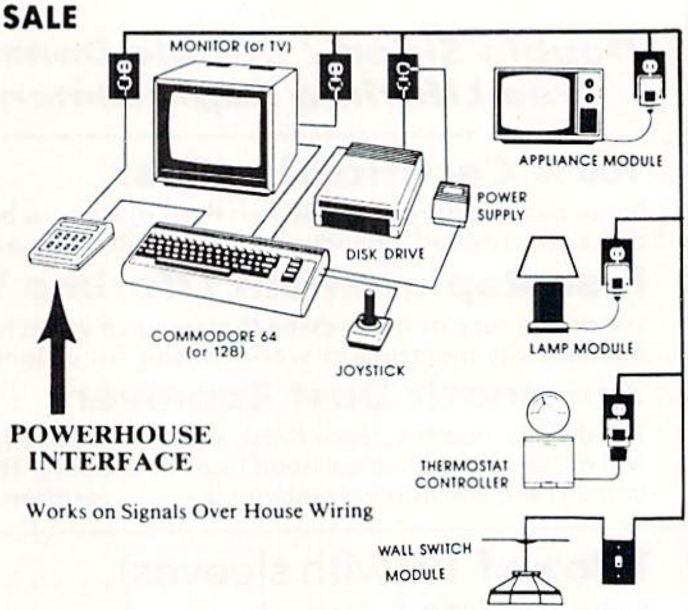
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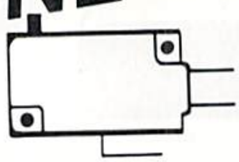
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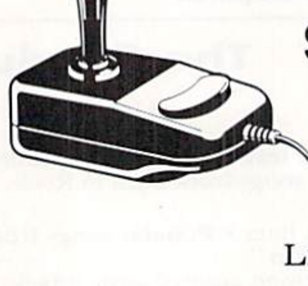


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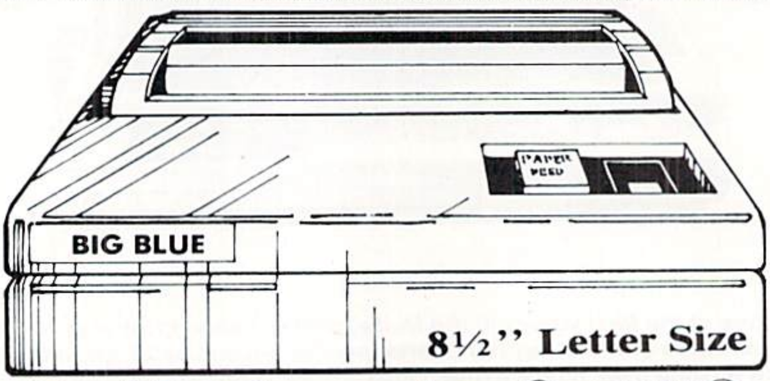
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Graphic Mode — Uni-directional

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| | | |
|---|---|---|
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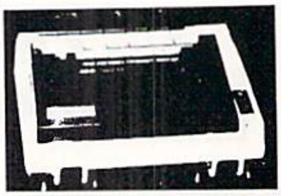
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# COMMODARES
## PROGRAMMING CHALLENGES
### By Dale Rupert

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

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We will print and discuss the cleverest, simplest, shortest, most interesting and/or most unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Put *your* name and address on the listings as well. Show sample runs if possible. Briefly describe your solutions and tell what makes them unique or interesting, if they are. You must enclose a stamped, self-addressed envelope if you want any of your materials returned. Solutions received by the middle of the month shown on the magazine cover are most likely to be discussed, but you may send solutions and comments any time. Your original programming problems, suggestions, and ideas are equally welcome. The best ones will become *Commodares!*

#### PROBLEM #47-1: FOUR WEIGHTS

This problem was submitted by Joe Butt (Knoxville, TN). The grocer can weigh any object from 1 to 40 pounds in exact 1 pound increments. He has only four different weights for his center-fulcrum balance scale. Weights may be placed on either side of the balance. What are the values of the weights? Letting the computer solve this classic problem should be an interesting endeavor.

If you understand the problem, get busy with it. Otherwise one example may clarify it. If you choose weights of 3 pounds and 4 pounds, the objects you could weigh are 1, 3, 4, and 7 pounds. To weigh a 1 pound object, put the 4 pound weight on one side of the balance, and put the object on the other side with the 3 pound weight.

#### PROBLEM #47-2: WEIGHTY PROBLEM

If you can't program your computer to figure out the weights in the problem above, at least program it to print out a table showing which of the four weights are used and on which side of the balance they are placed to measure every integer-weight object from 1 to 40 pounds. (If your computer can't figure out what the four weights are, you will have to do that yourself one way or another.)

#### PROBLEM #47-3: JOYFUL SPIRITS

Dan Balint wrote and said that this was not a dare. He wants a bare-bones program which creates a sprite and lets the user move it around with a joystick. Sorry, Dan, this certainly sounded like a dare to me. Let's see C-128 and C-64 versions.

#### PROBLEM #47-4: MUSICAL JOYS

While you have the joystick out and handy, write another brief routine which lets the user play a tune with the joystick controlling the pitch and any other relevant parameters (à la slide whistle, perhaps). Nothing fancy, mind you.

---

This month we will discuss the best solutions to *Commodares* from the July 1987 issue of *Ahoy! Problem #43-1: Euler's Primes* was submitted by Ariel Kroszynski (Lyngby, Denmark). The problem is to find the two prime number factors of the integer M where

```
M = 1 + 2 ^ (2 ^ 5) = 4,294,967,297
```

How the 18th century Swiss mathematician extraordinaire was able to find the two prime factors has always been a mystery to me.

Jim Speers (Niles, MI) pulled out his sequential disk file of prime numbers and used it to sort through possible factors of M. You never know when that file of primes will come in handy.

Since it is known that M has exactly two prime factors, we can test every integer, prime or not, for divisibility into M. The smallest one we find must be one of the prime factors. The quotient of M divided by that factor must be the other. The program must be able to perform lengthy division since M has more digits than the Commodore handles exactly.

This solution from Paul Vaughan (San Jose, CA) nicely fills the bill.

```
·1 REM ===================================
·2 REM    COMMODARES PROBLEM #43-1 :
·3 REM     EULER'S PRIMES
·4 REM    SOLUTION BY
·5 REM     PAUL VAUGHAN
·6 REM ===================================
·7 REM A.B=4294967297
·8 REM A=4294967...    B=.......297
·10 A=4294967 : B=297 : FOR N=7 TO 65537
 STEP 2
·11 H=INT(A/N) : RH=A-N*H : LR=1000*RH+B
·12 L=LR/N : RL=LR-N*INT(L) :IF RL=0 THEN
 14
·13 NEXT N : END
·14 PRINT"1+2[UPARROW](2[UPARROW]5)=42949
67297=" MID$(STR$(N),2)"*"MID$(STR$(H),2
)MID$(STR$(L),2)
```

Paul took the approach he used in the old days when calculators handled only 6 or 7 digits—he performed the division by parts. M is broken into A and B. Lines 11 and 12 perform the division. When an exact quotient is found, the program branches to line 14 and prints the results, namely 641 and 6,700,417.

You might find it enlightening to delve into Paul's algorithm. H and L store the "high portion" and "low portion" of M respectively. HR is the remainder of the division of H by N. The 1000 is used in line 11 because B is a 3-digit number. The remainder from the "high portion" division is actually in the 1000's place. RL stores the remainder of the "low portion" division.

To follow the algorithm, use some simple numbers you can easily calculate by hand. For example, let M=105432 and divide it by N=2. Break M into A=105 and B=432. Stepping through lines 11 and 12 gives H=52, RH=1, LR=1432, L=716, and RL=0, so that M divided by N is 52716 (by placing H next to L). Paul's solution takes less than eight seconds on the C-128 in fast mode.

Congratulations to Joe Butt (Knoxville, TN) and Bret Ekstrand (Signal Hill, CA) for their solutions. A special award of merit goes to Dave Shiloh (Eugene, OR) for his assembly language program which takes a mere 6.5 seconds to find the two prime factors. If you would like a copy of the source code in LADS assembler format, send me a self-addressed stamped envelope with your request clearly stated.

*Problem #43-2: Perm Parity* from Bret Ekstrand (Signal Hill, CA) was quite a challenge, just as Bret warned. But not tough enough to discourage the best contenders. The problem is to determine if any given permutation of the integers 1 through 5 is an even or an odd permutation.

Odd and even refer to the number of exchanges necessary to convert 12345 into the given arrangement. For example, 15342 is obtained by exchanging 2 and 5. That is one exchange, so 15342 is an odd permutation. Jim Speers reasoned that if it takes X moves to create a given permutation, it will take X reverse moves to restore it.

A standard approach was to perform a sort on the input permutation, keeping track of the number of exchanges to put it back into order. David Hoffner (Brooklyn, NY) sent a bubble-sort routine which used three lines. He topped even that with the following two-liner.

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #43-2 :
•3 REM     PERM PARITY
•4 REM    SOLUTION BY
•5 REM     DAVID HOFFNER
•6 REM ==================================
•7 REM > ENTER ONE DIGIT AT A TIME <
•10 FORQ=1TO5:INPUTB(Q):A(B(Q))=Q:NEXT:FO
 RN=1TO4:J=A(N):K=B(N):IFN<>JTHENT=1-T
•20 A(K)=J:B(J)=K:NEXT:PRINT MID$("EVENOD
 D",1+T*4,4)
```

Enter the permutation one digit at a time. According to David, B(N) shows which number is in position N. A(N) shows what position number N is in (like an index). His program then "partly" exchanges the number in each position with the number which should be in that position. T toggles each time an exchange is made.

His program does not actually need to complete each exchange. When exchanging the number in position 1 with the number in position 3, for example in 42135, the value in position 1 is put into 3, but 3's original value (the number 1) is not saved since the program never returns to position 1 anyway.

Now for *Problem #43-3: Random Order* from Paul Sobolik (Pittsburgh, PA). The user enters two integers as limits. The computer displays all the integers between and including the limits in random order.

There are many solutions to this problem. Most of them use an array to keep track of which values are selected. Typically a random number is picked and then the array is checked to see whether that number has been printed. When a value is printed, the corresponding element of the array is flagged.

This method works efficiently at first, but as the number of unprinted numbers decreases, there is less likelihood of randomly picking one of them. Waiting for the last number to be picked may take quite a while.

Among techniques which speed up this process is the following one sent by Jim Speers (Niles, MI).

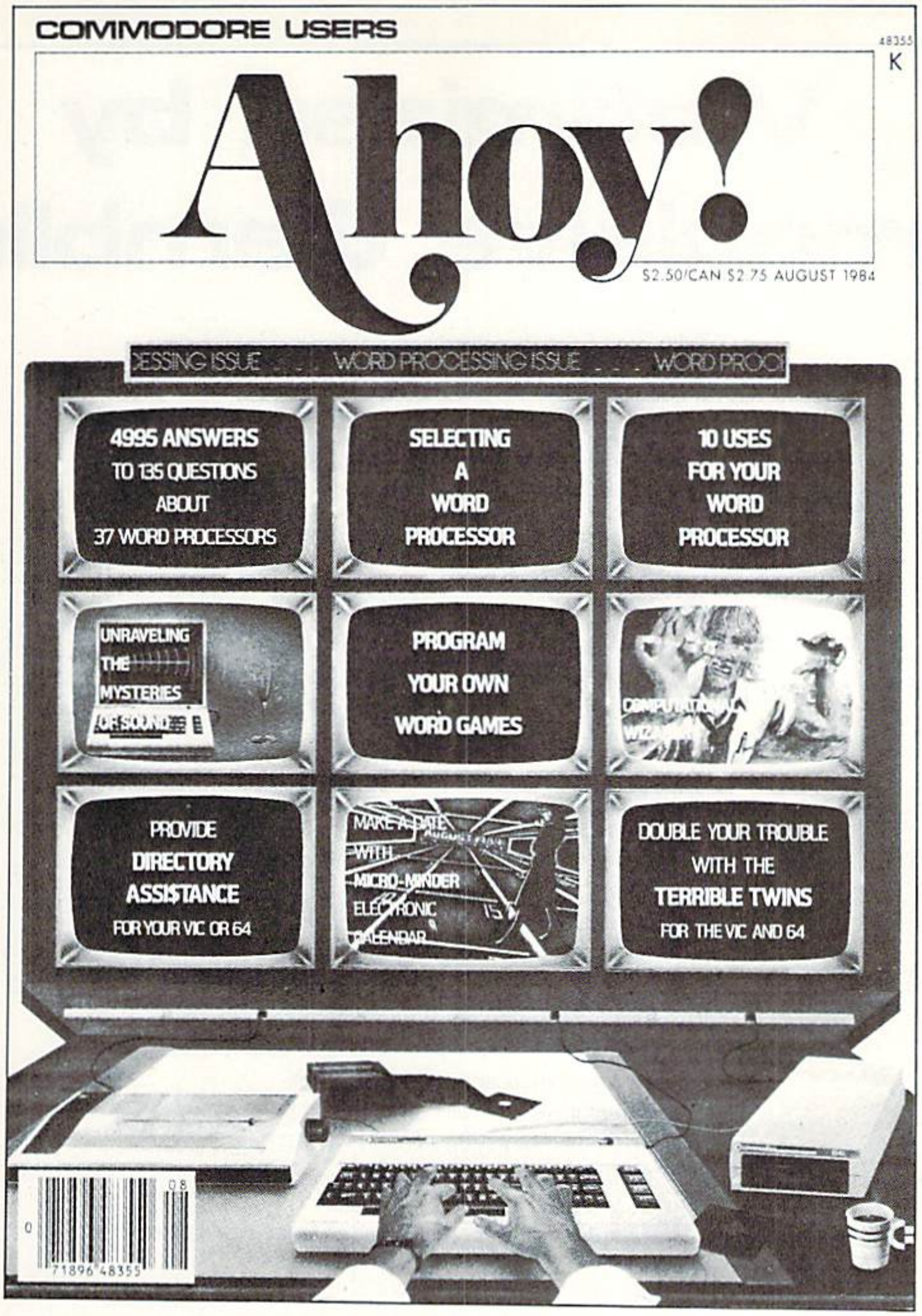
```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #43-3 :
•3 REM     RANDOM ORDER
•4 REM    SOLUTION BY
•5 REM     JIM SPEERS
•6 REM ==================================
•100 INPUT"LOWER LIMIT";L:L=INT(L+.5)
•110 INPUT"UPPER LIMIT";H:H=INT(H+.5)
•120 IF H<L THEN T=H : H=L : L=T
•130 W=H-L+1 : DIM N(W-1) : FOR I=1 TO W
•140 X=INT(RND(1)*W)
•150 IF N(X)=0 THEN 180
•160 X=X+1 : IF X=W THEN X=0
•170 GOTO 150
•180 N(X)=1 : PRINT X+L;
•190 NEXT I
```

The N( ) array keeps track of used values. N(X) is 0 if a number has not been picked. Otherwise N(X) is set to 1 in line 180. If a duplicate number is selected, then lines 160 and 170 come into action. Very simply, they look through N(X) to find the next unprinted number.

The IF statement in line 160 jumps back to the start of the N( ) array, so the entire array is searched if need be. Eventually an unprinted value will be found. This is much quicker than picking another random number whenever a duplicate is found.

Jim's program has some other interesting features. Lines 100 through 120 assure proper input values. If the user accidentally or otherwise enters the limit numbers in wrong order or specifies non-integers, the program corrects them. Line 120 swaps the input values if they are entered in reverse order.

Some programmers prefer to replace the THEN part of line 120 with GOTO 100. This forces the user to re-enter




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the values. In some cases it is important that the user be careful about specifying quantities. Here there is no reason that the computer shouldn't be smart enough to compensate for the user's inadequacies.

The other nice feature of Jim's program is that it allows positive or negative numbers for the range. The printed value is offset by L from the array index X. If L is −10 and X takes the values 0 through 8, for example, the values printed in line 180 range from −10 to −2.

A very clever approach was taken by Paul Sobolik in this solution to his own problem. It was the only solution which increased its speed as it progressed. Most other programs slowed down as the final values were printed. (Some nearly came to a dead stop.)

```
1 REM ===================================
2 REM     COMMODARES PROBLEM #43-3 :
3 REM      RANDOM ORDER
4 REM     SOLUTION BY
5 REM      PAUL SOBOLIK
6 REM ===================================
100 INPUT"LOW, HIGH";P1,P2
110 DIM S(P2):FOR X=0 TO P2:S(X)=X:NEXT
120 FOR X=P2 TO P1 STEP -1
130 :  Y=RND(1)*(X-P1)+P1
140 :  PRINT S(Y);
150 :  S(Y)=S(X)
160 NEXT : PRINT : PRINT
```

Paul said in his description of the program that it limits the range of possible random numbers to those not yet selected. This makes the process much faster than the standard approach of continuously choosing numbers in the total range and then rejecting those already used.

It took me a while to figure out just how this seemingly simple program works. I suggest you "play computer" with sample values to convince yourself that it does, in fact, solve the problem neatly and efficiently. A couple of clues for understanding it: Line 130 picks a random number between P1 and X, and X is decreased on each iteration. Line 150 is the magical part of the program. Study it to see for yourself why it works.

Peter Balducci (Lunenburg, MA) used a somewhat similar idea. Peter sequentially filled an array with the selected range of numbers. A random subscript is picked, and the corresponding number is printed. Then the printed value is removed from the array by moving the rest of the array up one position to replace it.

Joe Matello (Follansbee, WV) used another interesting and very efficient method. He first filled an array with the sequential numbers in the given range. Then he randomly selected pairs of elements to be swapped. After N swaps of an N-element array, he has a randomly arranged array which is simply printed out. Here is Joe's program:

```
1 REM ===================================
2 REM     COMMODARES PROBLEM #43-3 :
3 REM      RANDOM ORDER
4 REM     SOLUTION BY
5 REM      JOE MATELLO
6 REM ===================================
10 INPUT"ENTER LOWER LIMIT ";LL : INPUT"
ENTER UPPER LIMIT ";UL
20 NE=UL-LL+1 : DIM RN(NE) : FOR I=1 TO
NE:RN(I)=LL-1+I : NEXT : FOR I=1 TO NE
30 R1=INT(RND(0)*NE)+1:R2=INT(RND(0)*NE)
+1:TE=RN(R1):RN(R1)=RN(R2):RN(R2)=TE
40 NEXT:PRINT:FOR I=1 TO NE:PRINT RN(I);
: NEXT
```

The program could be somewhat faster and would produce even better results if R1 were just set equal to I in line 30 instead of being chosen randomly. That way each element in the array would be swapped with a randomly chosen element. Otherwise many elements in the array are still in their original positions. I wonder how many randomly chosen pairs of numbers must be swapped in Joe's program to guarantee that the array is in "random order"?

Congratulations to Wallace Leeker (Lemay, MO), John Thelen (Caledonia, WI), Russell Wilson (Fayette, AL), Patrick O'Malley, Jeremy Spiller, Marc Orenberg, Larry Schafer (Westphalia, MI), Don Weisenfluh (Oil City, PA), and Willie Williams (North Augusta, SC) for their solutions to this and other problems.

The final challenge was *Problem #43-4: Fraction Fun.* The problem (after some translation) was to find single digits with no duplicates for the letters in this equation:

```
DEFGHI / ABC = ABC
```

or equivalently:

```
ABC * ABC = DEFGHI
```

This short and straightforward solution from Frank Walczer (Omaha, NE) finds the three solutions:

```
567 * 567 = 321489
807 * 807 = 651249
854 * 854 = 729316
```

```
1 REM =================================
2 REM   COMMODARES SOLUTION #43-4 :
3 REM      FRACTION FUN
4 REM   SOLUTION BY
5 REM      FRANK WALCZER
6 REM =================================
7 REM
10 PRINT"THE VALID NUMBERS ARE:":PRINT
20 FOR D=100 TO 999
30 N=D*D : D$=STR$(D) : N$=STR$(N)
40 D$=MID$(D$,2,3) : N$=MID$(N$,2,6) :
 T$=D$+N$
50 IF LEN(T$)<>9 THEN 120
60 FOR X=1 TO 8
70 FOR Y=X+1 TO 9
80 IF MID$(T$,X,1)=MID$(T$,Y,1) THEN 120
90 NEXT Y
100 NEXT X
110 PRINT"[3" "]";D$" * ";D$;" = ";N$
120 NEXT D
```

Frank's program checks each three digit number from 100 to 999 in D. The 3-digit value is stored in D$, and the square of that value is stored in N$. A concatenated string of the 9 digits is stored in T$ in line 40.

The loops at lines 60 through 100 check T$ for duplicated digits. If a duplicate is found, the program branches to line 120 to select the next value of D.

Other readers used similar approaches, but several made some simplifying assumptions before the brute force search. Jim Speers pointed out that if A=0 then both D and E would be 0, and if C equals 0, 1, or 5, then I would equal the same value. The same is true for C=6. Paul Vaughan used the fact that since all digits are different, the largest value for DEFGHI is 987654 and the smallest value is 102345. Taking the square roots of these numbers shows that 319 < ABC < 993.

The least-anticipated solution came from Oren Dalton (El Paso, TX). Oren's program included guitar chords that played whenever a solution was found. The next time you are working on an otherwise mundane or time-consuming program, you might add Oren's guitar work to brighten it up. Just the sound routines are listed below.

```
20 REM =================================
30 REM   GUITAR CHORD SUBROUTINE
40 REM      TO ACCOMPANY YOUR
50 REM  OTHERWISE ORDINARY SOLUTIONS
60 REM      BY OREN DALTON
70 REM ===== C-64 OR C-128 ============
80 S=54272:GOSUB 230
90 FOR N=1 TO 3 : GOSUB 110:GOSUB 230:NE
XT: GOSUB 230:END
100 ===================================
110 R=54266:FOR J=1TO3:R=R+7: READ HF,LF
120 POKE R,HF:POKE R-1,LF: POKE R+3,17:F
OR K=1TO150:NEXT K,J
130 FOR J=12TO2 STEP-1:POKE S+24,J+32:FO
R K=1TO100:NEXT K,J:POKE S+24,33
140 FOR J=1TO20:NEXT:POKE S+24,32
150 RETURN
160 REM  E-MAJOR GUITAR CHORD =========
170 DATA 20,223,31,68,52,152
180 REM  D-MAJOR GUITAR CHORD  ========
190 DATA 18,209,28,49,47,107
200 REM  C-MAJOR GUITAR CHORD =========
210 DATA 16,195,25,30,42,62
220 REM === INITIALIZATION =============
230 FOR J=0TO24:POKE S+J,0:NEXT
240 POKES+24,44:POKE S+22,96:POKE S+21,0
250 POKE S+23,7:POKE S+5,0:POKE S+6,247:
POKE S+12,0:POKE S+13,247:POKE S+19,0
260 POKE S+20,247:POKE S+4,16:POKE S+11,
16:POKE S+18,16:RETURN
```

C-128 owners can probably reduce this program to six or eight lines. It will be a good task for some of you to dust off the SID register reference book and figure out what all the POKEs in this program are doing.

Enjoy this month's challenges. Keep those problems and solutions coming. □

## GET WITH THE PROGRAM(S)!

We try to remind you at least once a month about how we're constantly looking for the best magazine-length game, utility, and productivity software being written for the Commodore today. Some of you have believed us and sent us progarms that truly fit into that category—and your bank accounts are the fatter for it.

What about the rest of you? If you think you can do as well as or better than the programmers whose work appears in these pages, send us your best efforts on disk, accompanied by a printout, documentation, and a self-addressed envelope with sufficient return postage affixed.

Address your program to:

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# PROGRAM LISTINGS

**Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listings guide on this page.**

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!'s* program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart ♥. The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: e.g., 22 spaces as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines long; C-128 lines, a maximum of 160 characters, 2 or 4 screen lines in 40 or 80 columns respectively). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the C-128 and C-64. The version for your machine will help you proofread programs after typing them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See instructions preceding each program.)

On the second page following you will find *Flankspeed*, our ML entry program, and instructions on its use.

**Call *Ahoy!* at 212-239-6089 with any problems (if busy or no answer after three rings, call 212-239-0855).**

| WHEN YOU SEE | IT MEANS | YOU TYPE | YOU WILL SEE |
|---|---|---|---|
| [CLEAR] | Screen Clear | SHIFT CLR/HOME | |
| [HOME] | Home | CLR/HOME | |
| [UP] | Cursor Up | SHIFT ↑ CRSR ↓ | |
| [DOWN] | Cursor Down | ↑ CRSR ↓ | |
| [LEFT] | Cursor Left | SHIFT ← CRSR → | |
| [RIGHT] | Cursor Right | ← CRSR → | |
| [SS] | Shifted Space | SHIFT Space | |
| [INSERT] | Insert | SHIFT INST/DEL | |
| [DEL] | Delete | INST/DEL | |
| [RVSON] | Reverse On | CNTRL 9 | |
| [RVSOFF] | Reverse Off | CNTRL 0 | |
| [UPARROW] | Up Arrow | ↑ | ↑ |
| [BACKARROW] | Back Arrow | ← | ← |
| [PI] | PI | π | π |
| [EP] | English Pound | £ | £ |

| WHEN YOU SEE | IT MEANS | YOU TYPE | YOU WILL SEE |
|---|---|---|---|
| [BLACK] | Black | CNTRL 1 | |
| [WHITE] | White | CNTRL 2 | |
| [RED] | Red | CNTRL 3 | |
| [CYAN] | Cyan | CNTRL 4 | |
| [PURPLE] | Purple | CNTRL 5 | |
| [GREEN] | Green | CNTRL 6 | |
| [BLUE] | Blue | CNTRL 7 | |
| [YELLOW] | Yellow | CNTRL 8 | |
| [F1] | Function 1 | F1 | |
| [F2] | Function 2 | SHIFT F1 | |
| [F3] | Function 3 | F3 | |
| [F4] | Function 4 | SHIFT F3 | |
| [F5] | Function 5 | F5 | |
| [F6] | Function 6 | SHIFT F5 | |
| [F7] | Function 7 | F7 | |
| [F8] | Function 8 | SHIFT F7 | |

# BUG REPELLENT FOR THE 64 & 128 By BUCK CHILDRESS

Please note: the *Bug Repellent* programs listed here are for *Ahoy!* programs published from the May 1987 issue onward! For older programs, use the older version.

Type in, save, and run *Bug Repellent*. You'll be asked if you want automatic saves to take place. If so, you're prompted for the device, DISK (D) or TAPE (T). You then pick a starting file number, 0 through 99. Next, you enter a name, up to 14 characters long. At this point, *Bug Repellent* verifies your entries and gives you a chance to change them if you want. If no changes are needed, *Bug Repellent* activates itself. (Pressing RETURN without answering the prompts defaults to disk drive and begins your files with "00BACKUP".)

Type NEW and begin entering an *Ahoy!* program. As you enter program lines and press RETURN, a *Bug Repellent* code appears at the top of your screen. If it doesn't match the code in the program listing, an error exists. Correct the line and the codes will match.

If used, automatic saves take place every 15 minutes. When the RETURN key is pressed on a program line, the screen changes color to let you know that a save will begin in about three seconds. You may cancel the save by pressing the RUN STOP key. The file number increments after each save. It resets to 00 if 99 is surpassed. After saving, or cancelling, the screen returns to its original color and the timer resets for 15 minutes.

When you've finished using *Bug Repellent*, deactivate it by typing SYS 49152 [RETURN] for the Commodore 64 or SYS 4864 [RETURN] for the Commodore 128.

## C-64 BUG REPELLENT

```
·10 PRINTCHR$(147)"LOADING AND CHECKING THE DATA[3"."]":J
=49152
·20 FORB=0TO11:READA:IFA<0ORA>255THEN40
·30 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN50
·40 PRINT:PRINT"ERROR IN DATA LINE:"PEEK(64)*256+PEEK(63)
:END
·50 X=0:J=J+12:IFJ<49456THEN20
·60 POKE198,0:POKE49456,0:A$="Y":B$=A$:C$="D":D$="DISK":D
=8:PRINTCHR$(147)
·70 INPUT"DO YOU WANT AUTOMATIC SAVES (Y/N)";A$:PRINT:IFA
$="Y"THEN90
·80 PRINT"NO AUTOMATIC SAVES[3"."]":GOTO150
·90 POKE49456,1:INPUT"DISK OR TAPE (D/T)";C$:IFC$<>"D"THE
ND=1:D$="TAPE"
·100 POKE49457,D:D$=D$+" DRIVE":PRINT:INPUT"FILE NUMBER (
0-99)";N
·110 N$=RIGHT$(STR$(N),2):IFN<10THENN$=CHR$(48)+CHR$(N+48
)
·120 F$="BACKUP":PRINT:INPUT"FILENAME";F$:F$=N$+LEFT$(F$,
14):L=LEN(F$)
·130 POKE49458,L:FORJ=1TOL:POKE49458+J,ASC(MID$(F$,J,1)):
NEXTJ:PRINT
·140 PRINT"SAVING DEVICE ** "D$:PRINT"STARTING WITH ** "F
$
·150 PRINT:INPUT"IS THIS CORRECT (Y/N)";B$:IFB$<>"Y"THEN6
0
·160 POKE770,131:POKE771,164:SYS49152:END
·170 DATA169,79,32,210,255,162,38,160,192,204,3,3,1507
·180 DATA208,10,162,131,160,164,169,70,32,210,255,44,1615
·190 DATA169,78,32,210,255,142,2,3,140,3,3,76,1113
·200 DATA36,193,32,96,165,134,122,132,123,32,115,0,1180
·210 DATA170,240,243,162,255,134,58,144,3,76,150,164,1799
·220 DATA32,107,169,32,121,165,173,0,2,240,5,169,1215
·230 DATA79,141,2,3,76,162,164,169,0,133,2,133,1064
·240 DATA251,133,252,133,254,24,101,20,69,254,230,254,197
5
·250 DATA24,101,21,69,254,170,230,254,164,252,185,0,1724
·260 DATA2,133,253,201,34,208,6,165,2,73,255,133,1465
·270 DATA2,201,32,208,4,165,2,240,8,138,24,101,1125
·280 DATA253,69,254,170,44,198,254,230,252,164,253,208,23
49
·290 DATA213,138,41,240,74,74,74,74,24,105,129,141,1327
·300 DATA44,193,138,41,15,24,105,129,141,45,193,162,1230
·310 DATA0,189,43,193,240,12,157,0,4,173,134,2,1147
·320 DATA157,0,216,232,208,239,169,38,141,2,3,173,1578
·330 DATA48,193,240,23,165,161,201,212,176,4,165,160,1748
·340 DATA240,13,238,32,208,160,0,32,225,255,208,6,1617
·350 DATA32,33,193,76,38,192,232,208,242,200,208,239,1893
·360 DATA32,68,229,169,0,168,174,49,193,32,186,255,1555
·370 DATA173,50,193,162,51,160,193,32,189,255,169,43,1670
·380 DATA166,45,164,46,32,216,255,162,1,189,51,193,1520
·390 DATA168,200,152,201,58,144,2,169,48,157,51,193,1543
·400 DATA201,48,208,3,202,16,234,32,33,193,76,116,1362
·410 DATA164,206,32,208,169,0,170,168,76,219,255,160,1827
·420 DATA1,1,160,0,0,65,72,79,89,33,0,0,500
```

## C-128 BUG REPELLENT

```
·10 PRINTCHR$(147)"LOADING AND CHECKING THE DATA[3"."]":J
=4864
·20 FORB=0TO11:READA:IFA<0ORA>255THEN40
·30 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN50
·40 PRINT:PRINT"ERROR IN DATA LINE:"PEEK(66)*256+PEEK(65)
:END
·50 X=0:J=J+12:IFJ<5213THEN20
·60 POKE208,0:POKE5213,0:A$="Y":B$=A$:C$="D":D$="DISK":D=
8:PRINTCHR$(147)
·70 INPUT"DO YOU WANT AUTOMATIC SAVES (Y/N)";A$:PRINT:IFA
$="Y"THEN90
·80 PRINT"NO AUTOMATIC SAVES[3"."]":GOTO150
·90 POKE5213,1:INPUT"DISK OR TAPE (D/T)";C$:IFC$<>"D"THEN
D=1:D$="TAPE"
·100 POKE5214,D:D$=D$+" DRIVE":PRINT:INPUT"FILE NUMBER (0
-99)";N
·110 N$=RIGHT$(STR$(N),2):IFN<10THENN$=CHR$(48)+CHR$(N+48
)
·120 F$="BACKUP":PRINT:INPUT"FILENAME";F$:F$=N$+LEFT$(F$,
14):L=LEN(F$)
·130 POKE5215,L:FORJ=1TOL:POKE5215+J,ASC(MID$(F$,J,1)):NE
XTJ:PRINT
·140 PRINT"SAVING DEVICE ** "D$:PRINT"STARTING WITH ** "F
$
·150 PRINT:INPUT"IS THIS CORRECT (Y/N)";B$:IFB$<>"Y"THEN6
0
·160 POKE770,198:POKE771,77:SYS4864:END
·170 DATA32,58,20,169,41,162,19,236,3,3,208,4,955
·180 DATA169,198,162,77,141,2,3,142,3,3,224,19,1143
·190 DATA208,7,32,125,255,79,78,0,96,32,125,255,1292
·200 DATA79,70,70,0,96,162,0,134,251,189,0,2,1053
·210 DATA240,19,201,48,144,9,201,58,176,5,133,251,1485
·220 DATA232,208,238,134,252,165,251,208,3,76,198,77,2042
·230 DATA169,0,166,235,164,236,133,253,133,254,142,47,193
2
·240 DATA20,140,48,20,24,101,22,69,254,230,254,24,1206
·250 DATA101,23,69,254,170,230,254,164,252,185,0,2,1704
·260 DATA133,251,201,34,208,6,165,253,73,255,133,253,1965
·270 DATA201,32,208,4,165,253,240,8,138,24,101,251,1625
·280 DATA69,254,170,44,198,254,230,252,164,251,208,213,23
07
·290 DATA138,41,240,74,74,74,74,24,105,65,141,88,1138
·300 DATA20,138,41,15,24,105,65,141,89,20,32,79,769
·310 DATA20,189,85,20,240,6,32,210,255,232,208,245,1742
·320 DATA174,47,20,172,48,20,24,32,240,255,173,93,1298
·330 DATA20,240,27,165,161,201,212,176,4,165,160,240,1771
·340 DATA17,32,65,20,238,32,208,238,1,214,32,225,1322
·350 DATA255,208,6,32,49,20,76,198,77,232,208,242,1603
·360 DATA200,208,239,32,66,193,173,95,20,162,96,160,1644
·370 DATA20,32,189,255,169,0,170,32,104,255,169,0,1395
·380 DATA174,94,20,168,32,186,255,169,45,174,16,18,1351
·390 DATA172,17,18,32,216,255,162,1,189,96,20,168,1346
·400 DATA200,152,201,58,144,2,169,48,157,96,20,201,1448
·410 DATA48,208,3,202,16,234,32,49,20,141,0,2,955
·420 DATA76,183,77,58,59,32,65,20,206,32,208,206,1222
·430 DATA1,214,169,0,170,168,76,219,255,32,79,20,1403
·440 DATA169,26,141,0,214,173,0,214,16,251,96,162,1462
·450 DATA0,142,0,255,96,19,18,32,32,32,32,146,804
·460 DATA0,1,0,0,65,72,79,89,33,0,0,0,339
```

# FLANKSPEED FOR THE C-64 By GORDON F. WHEAT

*Flankspeed* will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program Saved with *Flankspeed* use LOAD "name",1,1 for tape, or LOAD "name",8,1 for disk. The function keys may be used after the starting and ending addresses have been entered.

f1–SAVEs what you have entered so far.

f3–LOADs in a program worked on previously.

f5–To continue on a line you stopped on after LOADing in the previous saved work.

f7–Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program. It temporarily freezes the output as well.

```
·100 POKE53280,12:POKE53281,11                                OP
·105 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[15" "]";       FP
·110 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY PROGRAM[6" "
 ]"                                                            JP
·115 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[9" "]"          FA
·120 PRINT"[RVSON][3" "]COPR. 1987, ION INTERNATIONAL INC.
 [3" "]"                                                       AJ
·125 FORA=54272TO54296:POKEA,0:NEXT                            ND
·130 POKE54272,4:POKE54273,48:POKE54277,0:POKE54278,249:PO
 KE54296,15                                                    NP
·135 FORA=680TO699:READB:POKEA,B:NEXT                          FL
·140 DATA169,251,166,253,164,254,32,216,255,96                 FF
·145 DATA169,0,166,251,164,252,32,213,255,96                   EK
·150 B$="STARTING ADDRESS IN HEX":GOSUB430:AD=B:SR=B           KP
·155 GOSUB480:IFB=0THEN150                                     OE
·160 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16                 AM
·165 B$="ENDING ADDRESS IN HEX":GOSUB430:EN=B                  PE
·170 GOSUB470:IFB=0THEN150                                     PG
·175 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16                     GM
·180 IFB>255THENB=B-255:POKE254,PEEK(254)+1                    HG
·185 POKE253,B:PRINT                                           EC
·190 REM  GET HEX LINE                                         ED
·195 GOSUB495:PRINT": [c P][LEFT]";:FORA=0TO8                  KD
·200 FORB=0TO1:GOTO250                                         IH
·205 NEXTB                                                     IJ
·210 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN340                     FA
·215 PRINT" [c P][LEFT]";                                      EG
·220 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "                     II
·225 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255                    GL
·230 NEXT                                                      GI
·235 IFA%(8)<>TTHENGOSUB375:GOTO195                            FL
·240 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOTO195             IM
·245 REM    GET HEX INPUT                                      PA
·250 GETA$:IFA$=""THEN250                                      GA
·255 IFA$=CHR$(20)THEN305                                      GO
·260 IFA$=CHR$(133)THEN535                                     LM
·265 IFA$=CHR$(134)THEN560                                     IG
·270 IFA$=CHR$(135)THENPRINT" ":GOTO620                        HO
·275 IFA$=CHR$(136)THENPRINT" ":GOTO635                        HE
·280 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55:GOTO295              MI
·285 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48:GOTO295              DJ
·290 GOSUB415:GOTO250                                          JA
·295 PRINTA$"[c P][LEFT]";                                     PK
·300 GOTO205                                                   FA
·305 IFA>0THEN320                                              BI
·310 A=-1:IFB=1THEN330                                         BB
·315 GOTO220                                                   FA
·320 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A-1                    BF
·325 A=A-1                                                     FK
·330 PRINTCHR$(20);:GOTO220                                    PH
·335 REM LAST LINE                                             CP
·340 PRINT" ":T=AD-(INT(AD/256)*256)                           KH
·345 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255                  OD
·350 NEXT                                                      OB
·355 IFA%(A)<>TTHENGOSUB375:GOTO195                            LH
·360 FORB=0TOA-1:POKEAD+B,A%(B):NEXT                           BO
·365 PRINT:PRINT"YOU ARE FINISHED!":GOTO535                    MB
·370 REM BELL AND ERROR MESSAGES                               LM
·375 PRINT:PRINT"LINE ENTERED INCORRECTLY":PRINT:GOTO415       JK
·380 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":GOTO415           PG
·385 PRINT:PRINT"ENDING IS LESS THAN STARTING!":B=0:GOTO41
 5                                                             IK
·390 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED RANGE!":B=0:
 GOTO415                                                       HK
·395 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:GOTO415            DM
·400 PRINT"?ERROR IN SAVE":GOTO415                             JK
·405 PRINT"?ERROR IN LOAD":GOTO415                             IO
·410 PRINT:PRINT:PRINT"END OF ML AREA":PRINT                   JO
·415 POKE54276,17:POKE54276,16:RETURN                          BF
·420 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:PRINTA$:RETURN          DH
·425 REM GET FOUR DIGIT HEX                                    IM
·430 PRINT:PRINTB$;:INPUTT$                                    OL
·435 IFLEN(T$)<>4THENGOSUB380:GOTO430                          JD
·440 FORA=1TO4:A$=MID$(T$,A,1):GOSUB450:IFT(A)=16THENGOSUB
 380:GOTO430                                                   AK
·445 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+T(4):RETURN       KB
·450 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-55:RETURN               GM
·455 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-48:RETURN               NJ
·460 T(A)=16:RETURN                                            IC
·465 REM ADDRESS CHECK                                         OL
·470 IFAD>ENTHEN385                                            HO
·475 IFB<SRORB>ENTHEN390                                       LE
·480 IFB<256OR(B>40960ANDB<49152)ORB>53247THEN395              OB
·485 RETURN                                                    HE
·490 REM ADDRESS TO HEX                                        PM
·495 AC=AD:A=4096:GOSUB520                                     AP
·500 A=256:GOSUB520                                            NF
·505 A=16:GOSUB520                                             LG
·510 A=1:GOSUB520                                              HE
·515 RETURN                                                    JD
·520 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):GOTO530                OC
·525 A$=CHR$(T+48)                                             JI
·530 PRINTA$;:AC=AC-A*T:RETURN                                 AA
·535 A$="**SAVE**":GOSUB585                                    IC
·540 OPEN1,T,1,A$:SYS680:CLOSE1                                AB
·545 IFST=0THENEND                                             FB
·550 GOSUB400:IFT=8THENGOSUB420                                PM
·555 GOTO535                                                   FI
·560 A$="**LOAD**":GOSUB585                                    PE
·565 OPEN1,T,0,A$:SYS690:CLOSE1                                PO
·570 IFST=64THEN195                                            OI
·575 GOSUB405:IFT=8THENGOSUB420                                CO
·580 GOTO560                                                   GN
·585 PRINT" ":PRINTTAB(14)A$                                   KA
·590 PRINT:A$="":INPUT"FILENAME";A$                            IO
·595 IFA$=""THEN590                                            HK
·600 PRINT:PRINT"TAPE OR DISK?":PRINT                          HL
·605 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+A$:RETURN              NP
·610 IFB$<>"T"THEN605                                          KO
·615 RETURN                                                    PH
·620 B$="CONTINUE FROM ADDRESS":GOSUB430:AD=B                  DD
·625 GOSUB475:IFB=0THEN620                                     NK
·630 PRINT:GOTO195                                             HN
·635 B$="BEGIN SCAN AT ADDRESS":GOSUB430:AD=B                  FK
·640 GOSUB475:IFB=0THEN635                                     LN
·645 PRINT:GOTO670                                             HI
·650 FORB=0TO7:AC=PEEK(AD+B):GOSUB505:IFAD+B=ENTHENAD=SR:G
 OSUB410:GOTO195                                               LM
·655 PRINT" ";:NEXTB                                           LE
·660 PRINT:AD=AD+8                                             CD
·665 GETB$:IFB$=CHR$(136)THEN195                               JD
·670 GOSUB495:PRINT": ";:GOTO650                               KE
```

**IMPORTANT!** Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 93 and 94 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

# ORBIT
## FROM PAGE 16

```
·10 REM ******************************           BC
·20 REM *           'ORBIT'              *       LJ
·30 REM *  BY CLEVELAND M. BLAKEMORE     *       EJ
·40 REM *        FOR THE C128            *       MD
·50 REM *    BASED LOOSELY ON THE        *       EO
·60 REM *  ORIGINAL MIT VERSION FOR      *       GG
·70 REM * THE PDP-1000 IN THE 1960'S     *       EO
·80 REM ******************************           BE
·90 GOTO140                                      HP
·100 FORB=LTON:IF(BO(B)ANDJ)THENSPRSAVA$(
 6),B+L:SOUNDP,M*Z,Z,P,M,M,N:SPRITEF,.:J=
 BUMP(L):J=BUMP(L):SPRITEB+L,.:U=U-BO(B)         MH
·110 NEXT:RETURN                                 LN
·120 FORX=1TO8:SPRSAVA$(6),X:MOVSPRX,H,V:
 MOVSPRX,45*(X-L)#L:SPRITEX,L,L,L,,,.:NEX
 T:SOUNDN,M*G,M*P,L,Z,M,N:FORJ=.TOA:FORX=
 8TO11:COLOR.,X:FORB=.TOZ:NEXTB,X,J              OB
·130 GOSUB350:GOSUB370:COLOR.,1:GOTO380          AF
·140 DIMD(4):M=360:D(2)=80:D(3)=100:D(4)=
 120:H=165:V=125:J=.:B=.:R=8:I=53248+21:F
 =5:E=1:G=15:U=G:A=7:C=16:W=17:L=1:P=2:N=
 3:Q=4:Z=42                                      MK
·150 DIMBO(7),A$(14):FORX=.TO7:BO(X)=2[UP
 ARROW]X:NEXT                                    DP
·160 COLOR.,1:COLOR4,1:COLOR1,7:COLOR2,7:
 COLOR3,6:GRAPHIC3,1,.:GRAPHIC.:SCALE.           JE
·170 DEFFNC(H)=RSPRITE(P,.)ORRSPRITE(N,.)
 ORRSPRITE(Q,.):DEFFNJ(H)=D(P)<ZORD(N)<ZO
 RD(Q)<Z                                         HI
·180 PRINT"[CLEAR]"TAB(11)"[8"[DOWN]"][BL
 UE]PLEASE STAND BY!":FORX=3584TO3967:REA
 DJ:POKEX,J:NEXT:FORX=1TO6:SPRSAVX,A$(X):
 NEXT                                            FD
·190 PRINTTAB(8)"[4"[DOWN]"][c 7]EARTH CO
 MING INTO VIEW!":FORX=3584TO4095:READJ:P
 OKEX,J:NEXT:FORX=1TO8:SPRSAVX,A$(6+X):NE
 XT                                              HB
·200 FORX=.TO99:J=(RND(1)*319)+1:B=(RND(1
 )*199)+1:DRAW1,J,B:NEXT                         LH
·210 FORX=1TO4:MOVSPRX,165,125:MOVSPRX,D(
 X);M:NEXT:MOVSPRL,Z;.                           AH
·220 GOSUB420:J=7:FORX=106TO106+24*3STEP2
 4:GSHAPEA$(J),X,65:J=J+1:NEXT                   JH
·230 FORX=106TO106+24*3STEP24:GSHAPEA$(J)
 ,X,86:J=J+1:NEXT                                EB
·240 FORX=1TO6:SPRSAVA$(X),X:NEXT:GRAPHIC
 3,.                                             JO
·250 SPRITE1,1,8,.,,,,1:SPRITE2,1,10,1,.:S
 PRITE3,1,3,1,.:SPRITE4,1,13,1:SPRITE5,.,
 2,.,,,,.:J=BUMP(L):J=BUMP(L):J=BUMP(L):B=
 BUMP(P):B=BUMP(P):SPRCOLOR2,3                   JJ
·260 FORX=1TO8:MOVSPRX,.#.:NEXT                  GB
·270 REM MAIN LOOP                               PJ
·280 E=L:FORX=.TOMSTEPR                          EC
·290 J=JOY(P):B=JANDG:IFBTHEND=D+(B=N)*F+
 (B=A)*-F+(D=MANDB=A)*M+(D=.ANDB=N)*-M:MO
 VSPRL,H,V:MOVSPRL,Z;D:SOUNDP,M*F,A,,,,.:
 ELSEFORB=.TOC:NEXT:B=.                          EE
·300 IFJ<>BANDETHENMOVSPRF,H,V:SPRITEF,L,
 P:MOVSPRF,D#L:SOUNDL,M*H,H,.,.,.,M,N:SPRCO
 LORN:E=.:U=UORC                                 FJ
·310 J=BUMP(L):IF(JANDC)ANDJ<>WTHENGOSUB1
 00:ELSEIFFNJ(.)THEN120                          NN
·320 POKEI,L:MOVSPRP,H,V:MOVSPRN,H,V:MOVS
 PRQ,H,V:MOVSPRP,D(P);M-X:MOVSPRN,D(N);X:
 MOVSPRQ,D(Q);M-X:POKEI,U:J=BUMP(L):J=BUM
 P(L):J=BUMP(L)                                  OJ
·330 NEXT:FORX=PTOQ:IFRSPRITE(X,.)THEND(X
 )=D(X)-F:NEXT:ELSENEXT                          CG
·340 E=L:SPRCOLORP:SPRITEF,.:SOUNDP,M*H,L
 ,,,M,.:U=UANDG:IFFNC(.)THEN280:ELSEGOSUB
 350:GOSUB360:GOTO380                            GO
·350 GRAPHIC.:PRINTCHR$(19):SYS65520,.,16
 ,.:PRINTCHR$(27)"@":FORX=1TO8:SPRITEX,.:
 NEXT:RETURN                                     CC
·360 PRINTTAB(8)"[BLUE]YOU HAVE SAVED THE
  PLANET!":SOUNDN,30000,H,P,300,3000,P:RE
 TURN                                            KP
·370 COLOR.,1:X=(RND(1)*50000)+10000:PRIN
 TTAB(3)"[BLUE]ASTEROID [c 7]IMPACT[BLUE]
  KILLS ";:PRINTUSING"[5"#"]";X;:PRINT" P
 EOPLE!"                                         CD
·380 PRINTTAB(11)"[3"[DOWN]"]ANOTHER GAME
 ?(Y/N)":DO:GETK$:LOOPUNTILK$="":GETKEYK$        EI
·390 IFK$<>"Y"THENGRAPHICCLR:COLOR.,12:CO
 LOR4,14:PRINT"[CLEAR][c 6]":END                 LL
·400 FORX=1TO6:SPRSAVA$(X),X:NEXT:GOSUB42
 0:GRAPHIC3                                      GP
·410 D(2)=80:D(3)=100:D(4)=120:D=.:U=15:D
 O:LOOPUNTILJOY(P)=.:GOTO250                     GJ
·420 PRINT"[CLEAR][4"[DOWN]"][3" "][c 7][
 RVSON][s U][33"[s C]"][s I]"                    IL
·430 PRINT"[3" "][RVSON][s B][RVSOFF][33"
  "][RVSON][s B]"                                JP
·440 PRINT"[3" "][RVSON][s B][RVSOFF]  [B
 LUE][RVSON][sEP][s M][3" "][c *][sEP][s
 M] [c I][c I][c *][sEP][s M] [c I][c I][
 c *][sEP][s M] [c *][sEP][s M][4" "][c *
 ][RVSOFF]  [c 7][RVSON][s B]"                   MH
·450 PRINT"[3" "][RVSON][s B][RVSOFF] [BL
 UE][RVSON][sEP]  [s M][c *][RVSOFF][s N]
 [c *][RVSON][s M] [s M] [c @][c @][s L]
 [s M][3" "][s M] [s M] [s M][s N][c T][s
  M] [c *][RVSOFF][s N]  [c 7][RVSON][s B
 ]"                                              ME
·460 PRINT"[3" "][RVSON][s B][RVSOFF] [BL
 UE][c *][RVSON][3" "][s M][c *][RVSOFF]
```

```
 [c *][RVSON][s M] [s M][s M][s N][s M][s
  M] [s M][c *][RVSOFF][s N][c *][RVSON][
 s M] [s M] [s M][s N] [s M] [c *][RVSOFF
 ]  [c 7][RVSON][s B]"                      DF
·470 PRINT"[3" "][RVSON][s B][RVSOFF]  [B
 LUE][c *][RVSON][3" "][s M][3" "][s M] [
 s M][s M] [s M][s M] [s M][3" "][s M] [s
  M][c @][s M]  [s M] [c *][RVSOFF] [c 7]
 [RVSON][s B]"                              MH
·480 PRINT"[3" "][RVSON][s B][RVSOFF][3"
 "][BLUE][c *][RVSON]  [s N][3"[c T]"][s
 N] [s N][s N] [s N][s N] [s N][3"[c T]"]
 [s N] [s N] [RVSOFF][sEP][c *][RVSON] [s
  N][c Y][RVSOFF][sEP] [c 7][RVSON][s B]" MG
·490 PRINT"[3" "][RVSON][s B][RVSOFF][4"
 "][BLUE][c *][RVSON][s N][3" "][RVSOFF][
 sEP][c *][RVSON][s N][RVSOFF][sEP][c *][
 RVSON][s N][RVSOFF][sEP][c *][RVSON][s N
 ][3" "][RVSOFF][sEP][c *][RVSON][s N] [R
 VSOFF][sEP]  [c *][RVSON] [RVSOFF][sEP]
  [c 7][RVSON][s
  B]"                                       KH
·500 PRINT"[3" "][RVSON][s B][RVSOFF][33"
  "][RVSON][s B]"                           PB
·510 PRINT"[3" "][RVSON][c Q][9"[s C]"] F
 OR THE C128 [10"[s C]"][c W]"              JB
·520 PRINT"[3" "][RVSON][s B][c 8]  1987
  CLEVELAND M. BLAKEMORE[3" "][c 7][s B]" OP
·530 PRINT"[3" "][RVSON][c Q][33"[s C]"][
 c W]"                                      ME
·540 PRINT"[3" "][RVSON][s B][c 8]JOYSTIC
 K IN PORT 2:FIRE TO BEGIN![c 7][s B]"      JO
·550 PRINT"[3" "][RVSON][s J][33"[s C]"][
 s K]"                                      HD
·560 SOUND1,9000,10,2,300,3000,.            MA
·570 IFJOY(2)<128THEN560:ELSERETURN         EP
·580 REM SPRITE DATA                        MP
·590 DATA0,,,,,,,.                          IH
·600 DATA0,,,,,,,.                          HB
·610 DATA0,,,,,,,.                          GD
·620 DATA0,,,,16,,,16                       CF
·630 DATA0,,,,,,,.                          JP
·640 DATA0,,,,,,,.                          KJ
·650 DATA0,,,,,,,.                          JL
·660 DATA0,,,,,,,.                          JF
·670 DATA0,,,,,,,42                         AO
·680 DATA0,1,191,,2,85,96,13                NK
·690 DATA62,160,10,237,240,22,188,40        PH
·700 DATA57,26,88,21,213,244,46,161         MB
·710 DATA88,26,59,148,49,102,216,14         HB
·720 DATA185,144,27,86,56,6,196,80          IK
·730 DATA1,109,160,1,178,128,,12            PF
·740 DATA0,,,,,,,.                          OF
·750 DATA0,,,,,,,.                          CH
·760 DATA0,,,,,213,,1                       JA
·770 DATA62,128,6,237,192,14,188,32         LL
·780 DATA9,26,96,5,213,224,14,161           OO
·790 DATA96,10,59,160,9,102,192,6           NB
·800 DATA185,128,3,86,128,,197,.            AN
·810 DATA0,108,,,,,,.                       MB
·820 DATA0,,,,,,,.                          DC
·830 DATA0,,,,,,,.                          EM
·840 DATA0,,,,,,,.                          GO
·850 DATA0,,,48,,,204,.                     ID
·860 DATA0,182,,1,78,,1,57                  DG
·870 DATA0,1,70,,,220,,.                    JJ
·880 DATA48,,,,,,,.                         ND
·890 DATA0,,,,,,,.                          JA
·900 DATA0,,,,,,,.                          IC
·910 DATA0,,,,,,,.                          JM
·920 DATA0,,,,,,,.                          LO
·930 DATA0,,,,,,,.                          MI
·940 DATA0,,,,48,,,48                       HE
·950 DATA0,,,,,,,.                          LE
·960 DATA0,,,,,,,.                          PG
·970 DATA0,,,,,,,.                          OA
·980 DATA0,,,,,,,.                          NC
·990 DATA32,,2,16,8,,,.                     NB
·1000 DATA8,4,8,,,,32,1                     OI
·1010 DATA8,,64,,128,16,72,.                PM
·1020 DATA4,58,,1,85,82,,239                CI
·1030 DATA0,85,85,128,,108,32,.             HM
·1040 DATA18,8,1,5,2,,64,128                MA
·1050 DATA4,4,64,,128,32,16,4               PF
·1060 DATA16,1,,8,64,4,,.                   HC
·1070 REM EARTHSHAPES                       AM
·1080 DATA0,,,,,,,.                         EL
·1090 DATA0,,,,,,,.                         EF
·1100 DATA0,1,,,5,,,25                      OE
·1110 DATA0,,117,,,122,,1                   HN
·1120 DATA255,,1,255,,3,255,.               OE
·1130 DATA7,255,,7,251,,31,230              CK
·1140 DATA0,30,245,,29,245,,31              MN
·1150 DATA229,,31,237,,31,217,.             OM
·1160 DATA0,1,255,,62,93,3,85               DN
·1170 DATA119,61,85,107,213,86,183,85       JA
·1180 DATA86,253,85,90,221,85,87,235        KP
·1190 DATA85,87,117,101,253,94,159,255      NA
·1200 DATA253,223,254,253,247,255,249,119 HD
·1210 DATA95,189,86,95,254,89,87,255        ID
·1220 DATA85,87,253,85,87,254,85,87         OE
·1230 DATA253,85,85,255,85,85,255,.         JH
·1240 DATA255,128,,231,124,,215,151         GA
·1250 DATA192,159,229,252,127,213,215,159 EE
·1260 DATA229,85,215,229,85,167,229,85      GD
·1270 DATA247,213,85,215,214,85,87,151      CP
·1280 DATA85,149,85,87,101,85,87,117        KN
·1290 DATA85,94,249,85,85,253,85,215        CL
·1300 DATA245,85,95,245,85,127,229,85       KP
·1310 DATA126,229,85,230,213,85,223,.       CN
·1320 DATA0,,,,,,,.                         EA
·1330 DATA0,,,,,,,192                       JB
·1340 DATA0,,96,,,120,,.                    GL
·1350 DATA100,,,86,,,159,.                  JG
·1360 DATA0,127,128,,255,192,,255           JI
·1370 DATA224,,255,224,,255,240,.           GJ
```

**IMPORTANT!** Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 93 and 94 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
·1380 DATA255,240,,191,240,,223,248      FO
·1390 DATA0,255,248,,191,248,,.          CN
·1400 DATA0,31,213,,31,213,,30           FB
·1410 DATA85,,29,85,,31,85,.             KN
·1420 DATA14,153,,5,174,,7,213           IA
·1430 DATA0,2,86,,1,223,,.               BO
·1440 DATA159,,,127,,,37,.               EF
·1450 DATA0,25,,,5,,,3                   EF
·1460 DATA0,,,,,,,.                      LE
·1470 DATA0,,,,,,,.                      PG
·1480 DATA85,85,125,85,85,121,85,149     OG
·1490 DATA89,85,85,86,85,85,85,85        HG
·1500 DATA85,85,85,85,85,85,85,85        AF
·1510 DATA85,85,85,85,85,85,149,85       GH
·1520 DATA85,213,85,85,213,85,85,85      MG
·1530 DATA85,85,89,85,85,85,85,85        BD
·1540 DATA213,85,85,61,85,85,3,213       EB
·1550 DATA85,,62,85,,1,255,.             EB
·1560 DATA149,85,91,85,85,253,85,85      HI
·1570 DATA254,85,87,255,85,87,255,249    CE
·1580 DATA85,255,254,85,127,255,213,95   LE
·1590 DATA255,149,95,127,149,95,127,85   OO
·1600 DATA86,126,85,85,126,85,85,125     EK
·1610 DATA85,85,121,85,85,117,85,85      GG
·1620 DATA117,85,87,85,85,124,85,87      LL
·1630 DATA192,85,124,,255,128,,.         FJ
·1640 DATA215,224,,231,208,,85,144       DF
·1650 DATA0,213,208,,149,80,,085         LD
·1660 DATA80,,85,96,,85,96,.             FM
·1670 DATA85,64,,85,128,,085,.           AF
·1680 DATA0,86,,,84,,,88                 LI
·1690 DATA0,,96,,,192,,.                 PL
·1700 DATA0,,,,,,,.                      MB
·1710 DATA0,,,,,,,.                      LD
```

# AMAZING STRUCTURES
## FROM PAGE 20

### AMAZEMENT

```
·10 REM --------------------------------- OC
·11 REM          AMAZEMENT                CK
·12 REM      RUPERT REPORT #47            PA
·13 REM                                   JK
·14 REM        C-128 / C-64               MC
·15 REM C-64 USERS SEE NOTES AT LINE 2000 GA
·16 REM                                   KB
·17 REM --------------------------------- ON
·20 REM =============== INITIALIZATION =  BL
·30 PRINT CHR$(147)                       GA
·40 FALSE=0 : TRUE=NOT FALSE              GP
·50 NC=100         :REM # CELLS           HB
·60 SQ=INT(SQR(NC)+.5)       :REM WIDTH OF
  SQUARE                                  NM
·70 DIM MV(NC,1),MS(NC,4)  :REM MOVES AND
  MAZE STRUCTURE                          CK
·80 DIM X(NC),Y(NC)            :REM SCREEN
  POSITIONS                               OK
·90 GOSUB 1320    :REM GET MAZE STRUCTURE FJ
·100 GOSUB 1500 :REM GET SCREEN POSITIONS GO
·110 GOSUB 1700     :REM  DRAW SCREEN     EO
·120 DLY=100        :REM  MOVE DELAY      FP
·130 FOR N=1 TO NC : IF MS(N,0)=3 THEN C=
 N : N=NC                                 JK
·140 NEXT N    :REM  FIND STARTING CELL   AL
·150 IF C=0 THEN PRINT"NO STARTING CELL"
 : END                                    BJ
·160 REM ==================== MAIN LOOP = LF
·170 GOSUB 300    :REM  PICK MOVE         PJ
·180 GOSUB 400    :REM  CHECK MOVE        GA
·190 GOSUB 900    :REM  UPDATE SCREEN     FC
·200 IF NOT XIT AND NOT NOSOLN THEN 170   IN
·210 CHAR ,0,21   :REM  POSITION CURSOR   HJ
·220 IF NOSOLN THEN PRINT"NO SOLUTION" :
  END                                     HB
·230 GOSUB 3010   :REM RETRACE SOLUTION   NB
·240 CHAR ,0,21                           LJ
·250 END                                  HK
·260 REM ================================ FC
·300 REM --------------------- PICK MOVE - EJ
·310 GDMOVE=TRUE        :REM ASSUME GOOD  HE
·320 MV(C,0)=MV(C,0)+1       :REM INCREMENT
  MOVE DIRECTION; C=CURRENT CELL          GL
·330 DIR=MV(C,0)    :REM CURRENT DIRECTION MK
·340 RETURN                               OD
·350 REM                                  OM
·400 REM -------------------- CHECK MOVE - DP
·410 BKUP=FALSE    :REM ASSUME NO BACKUP  CO
·420 IF DIR>4 THEN GOSUB 800 : GOTO 490 :
  REM MUST BACK UP                        MB
·430 NXTCELL=MS(C,DIR)   :REM NEXT CELL # BK
·440 CS=MS(NXTCELL,0)    :REM CELL STATUS EC
·450 REM  CS=0,2,3 INVALID MOVE           JN
·460 REM  CS=1       VALID MOVE           AF
·470 REM  CS=4       END OF MAZE          MI
·480 ON CS+1 GOSUB 600,500,600,600,700    FG
·490 RETURN         :REM  TO MAIN LOOP    EI
·500 REM -------------------- VALID MOVE - OD
·510 MV(C,0)=DIR         :REM SET FWD LINK AK
·520 MV(NXTCELL,1)=C     :REM SET BACK LINK DF
·530 MS(NXTCELL,0)=2     :REM STATUS=USED FN
·540 C=NXTCELL           :REM CURRENT CELL IP
·550 RETURN                               LG
·600 REM ------------------ INVALID MOVE - DJ
·610 GDMOVE=FALSE                         DK
·620 IF MS(C,0)=3 AND MV(C,0)=4 THEN NOSO
 LN=TRUE                                  GN
·630 RETURN                               AG
·700 REM ------------------------- DONE - HC
```

```
·710 MV(C,0)=DIR          :REM SET FWD LINK  OJ
·720 MV(NXTCELL,1)=C     :REM SET BACK LINK  KN
·730 C=NXTCELL                               AL
·740 XIT=TRUE                                MM
·750 RETURN                                  HO
·800 REM ------------------------ BACKUP -   BJ
·810 RESTART=FALSE :REM ASSUME NO RESTART    LG
·820 NXTCELL=MV(C,1)    :REM USE BACK LINK   MJ
·830 MV(C,0)=0       :REM RESTORE FWD LINK   NE
·840 MS(C,0)=1          :REM SET STATUS TO
 AVAILABLE                                   KG
·850 C0=C             :REM SAVE OLD CELL #   AF
·860 C=NXTCELL                               IK
·870 BKUP=TRUE                               JB
·880 IF MS(C,0)=3 THEN RESTART=TRUE : IF
 MV(C,0)=4 THEN NOSOLN=TRUE                  KB
·890 RETURN                                  AL
·900 REM ----------------- SCREEN UPDATE -   EO
·910 C$="O"                                  DB
·920 IF NOT GDMOVE THEN GOTO 1060            GN
·930 IF XIT THEN C$="E" : GOTO 1000          CG
·940 IF NOT BKUP THEN GOTO 1000              AE
·950 IF NOSOLN OR RESTART THEN C$="S"        CJ
·960 REM  RESTORE CELL C0 TO UNUSED          GK
·970 CHAR ,X(C0),Y(C0)," "                   PA
·980 CHAR ,X(C0),Y(C0),"*"                   BE
·990 REM  MOVE CURSOR TO CELL C              HJ
·1000 FOR N=1 TO 2                           GB
·1010 CHAR ,X(C),Y(C)," "                    LN
·1020 FOR P=1 TO DLY : NEXT                  OK
·1030 CHAR ,X(C),Y(C),C$                     IG
·1040 FOR P=1 TO DLY : NEXT                  BD
·1050 NEXT N                                 PG
·1060 RETURN    :REM TO MAIN                 DP
·1070 REM ================================== GH
·1100 REM        MAZE DATA STRUCTURE         BH
·1110 REM                                    OL
·1120 REM     MS(C,N): C=CELL #, N=0-4       NC
·1130 REM N=0: CURRENT CELL STATUS           DB
·1140 REM  0=NO ACCESS,1=AVAILABLE,2=USED    IA
·1150 REM    3=START, 4=END                  FF
·1160 REM N=1-4: CELL #'S IN DIRECTIONS      FK
·1170 REM        1-4 FROM CELL C;            LB
·1180 REM    1=UP, 2=RT, 3=DOWN, 4=LEFT      EE
·1190 REM ---------------------------------- CP
·1200 REM  MS(C,0) CELL STATUS DATA          NP
·1210 DATA 1,0,0,0,1,1,1,1,1,1               NJ
·1220 DATA 1,1,1,1,0,0,1,0,1,0               KI
·1230 DATA 1,0,0,1,1,0,1,0,1,0               HH
·1240 DATA 1,0,0,0,1,0,1,0,1,0               CG
·1250 DATA 0,1,1,1,1,0,1,0,1,0               EC
·1260 DATA 1,1,0,0,1,0,1,0,1,0               KJ
·1270 DATA 1,0,0,0,0,0,1,0,1,1               NO
·1280 DATA 1,0,0,0,0,0,1,0,0,1               EG
·1290 DATA 3,1,1,1,1,1,1,0,1,1               LG
·1300 DATA 1,0,0,0,0,4,0,1,1,0               LG
·1310 REM          READ CELL STATUS DATA     OD
·1320 FOR N=1 TO NC : READ MS(N,0) : NEXT    AK
```

```
·1330 REM         CALC ADJACENT CELL #'S     OH
·1340 FOR N=1 TO NC : MOD%=N-SQ*INT(N/SQ+
 .01)                                        FM
·1350 MS(N,1)=N-SQ : IF N<SQ+1 THEN MS(N,
 1)=0                                        CG
·1360 MS(N,2)=N+1 : IF MOD%=0 THEN MS(N,2
 )=0                                         FB
·1370 MS(N,3)=N+SQ : IF N>NC-SQ THEN MS(N
 ,3)=0                                       BL
·1380 MS(N,4)=N-1 : IF MOD%=1 THEN MS(N,4
 )=0                                         EJ
·1390 NEXT N                                 ED
·1400 RETURN                                 AL
·1500 REM --- GET CELL SCREEN LOCATIONS -    NB
·1510 ROW=1                                  MG
·1520 COL=1                                  LM
·1530 FOR C=1 TO NC STEP SQ                  CA
·1540 FOR N=C TO C+SQ-1                      AK
·1550 Y(N)=ROW                               LP
·1560 X(N)=COL : COL=COL+3                   EO
·1570 NEXT N                                 PA
·1580 ROW=ROW+2 : COL=1                      LO
·1590 NEXT C                                 AH
·1600 RETURN                                 NE
·1700 REM ------------------ DRAW SCREEN -   NN
·1710 PRINT CHR$(147)                        PO
·1720 FOR N=1 TO NC                          KO
·1730 C$="." : IF MS(N,0)=1 THEN C$="*"      PJ
·1740 IF MS(N,0)=3 THEN C$="S"               DC
·1750 IF MS(N,0)=4 THEN C$="E"               BN
·1760 CHAR ,X(N),Y(N),C$                     LA
·1770 NEXT                                   HC
·1780 RETURN                                 II
·2000 REM ===============================    EP
·2010 REM >>> NOTES FOR C-64 USERS:          KA
·2020 REM CHANGE THE   'CHAR'                EI
·2030 REM STATEMENTS IN LINES  210, 240,     HF
·2040 REM  970, 980, 1010, 1030, & 1760      DI
·2100 REM TO THE FOLLOWING:                  ED
·2110 REM  210 A=0:B=21:CH$="":GOSUB 2200    PC
·2120 REM  240 A=0:B=21:CH$="":GOSUB 2200    LL
·2130 REM  970 A=X(C0):B=Y(C0):CH$=" ":GO
 SUB 2200                                    AJ
·2140 REM  980 A=X(C0):B=Y(C0):CH$="*":GO
 SUB 2200                                    GG
·2150 REM 1010 A=X(C):B=Y(C):CH$=" ": GOS
 UB 2200                                     OK
·2160 REM 1030 A=X(C):B=Y(C):CH$=C$ : GOS
 UB 2200                                     EF
·2170 REM 1760 A=X(N):B=Y(N):CH$=C$ : GOS
 UB 2200                                     FD
·2180 REM ===============================    KE
·2190 REM  C-64 ONLY  >>>>>>>>               FJ
·2200 POKE 214,B-1 : PRINT                   AH
·2210 POKE 211,A : PRINT CH$ : RETURN        GO
·2220 REM ===============================    EM
·3000 REM --- RETRACE THE SOLUTION ----      FB
·3010 C$="-"                                 FL
```

```
•3020 C=MV(C,1) :IF MS(C,0)<>3 THEN GOSUB
  1000 : GOTO 3020                          FH
•3030 C$="+"                                GN
•3040 C=MS(C,MV(C,0)) :IF MS(C,0)<>4 THEN
  GOSUB 1000 : GOTO 3040                    FG
•3050 RETURN                                ID
```

# DESERT FRONT
## FROM PAGE 18

**Starting address in hex: C000**
**Ending address in hex: CF38**
**SYS to start: 49152**

***Flankspeed*** **required for entry! See page 95.**

```
C000: A9 30 85 38 AD 0E DC 29 59
C008: FE 8D 0E DC A5 01 29 FB 4B
C010: 85 01 A9 FF 85 61 A9 07 D7
C018: 85 62 A5 62 18 69 D0 A4 FE
C020: 61 84 63 85 64 A0 00 B1 A5
C028: 63 8D 00 08 A5 62 18 69 AA
C030: 30 A4 61 84 63 85 64 A0 D8
C038: 00 AD 00 08 91 63 A6 62 EB
C040: A4 61 C6 61 C0 00 D0 D2 D2
C048: C6 62 8A D0 CD A5 01 09 4A
C050: 04 85 01 AD 0E DC 09 01 7D
C058: 8D 0E DC 20 E4 C8 A0 00 3F
C060: 8C 03 08 8C 04 08 AE 04 43
C068: 08 BD 75 C9 F0 1F EE 04 70
C070: 08 A0 00 AE 04 08 BD 75 07
C078: C9 AE 03 08 9D 48 32 EE 03
C080: 03 08 EE 04 08 C0 07 F0 3F
C088: DD C8 4C 73 C0 AD 18 D0 46
C090: 29 F0 09 0C 8D 18 D0 A2 D8
C098: 00 A0 20 86 61 84 62 A0 C8
C0A0: 00 B9 BE CA 91 61 C8 C0 60
C0A8: 00 D0 F6 E6 62 B9 BE CB FD
C0B0: 91 61 C8 C0 00 D0 F6 E6 DB
C0B8: 62 C0 80 F0 09 B9 BE CC 9B
C0C0: 91 61 C8 4C B9 C0 A2 00 E5
C0C8: A0 80 84 61 8E 03 08 8E F7
C0D0: 04 08 8E 00 08 EE 03 08 6D
C0D8: AD 03 08 C9 09 F0 3B C9 5A
C0E0: 05 D0 02 E6 62 A2 00 E0 85
C0E8: 33 F0 0E AC 00 08 A9 00 79
C0F0: 91 61 EE 00 08 E8 4C E7 F7
C0F8: C0 A2 00 A0 00 C0 0D F0 BB
C100: D4 AE 04 08 BD 3D CD 84 DC
C108: 63 AC 00 08 91 61 EE 00 02
C110: 08 A4 63 C8 EE 04 08 4C 30
C118: FD C0 20 44 E5 A9 00 8D 58
C120: 20 D0 8D 21 D0 A2 A5 A0 79
C128: CD 86 61 84 62 20 3D C9 EB
C130: A2 34 A0 CE 86 61 84 62 45
C138: 20 3D C9 AD 00 DC 29 10 23
C140: C9 10 F0 F7 20 44 E5 A2 EF
C148: 00 A9 E0 9D 08 06 9D A8 C4
C150: 06 9D 48 07 A9 0B 9D 80 16
C158: DA 9D 20 DB 9D 48 DB A9 38
C160: 07 9D E0 D9 E8 E0 A0 D0 FA
C168: E0 A9 64 8D 11 08 A9 88 30
C170: 8D F8 07 A9 B4 8D 21 08 13
C178: A2 00 A9 30 9D EB 06 E8 6D
C180: E0 06 D0 F8 A2 16 A0 CF 5A
C188: 86 61 84 62 20 3D C9 A2 21
C190: 00 A0 00 A9 20 9D 01 07 A0
C198: 9D 08 07 A9 48 9D 0D 07 E8
C1A0: A9 02 9D 01 DB 9D 08 DB 48
C1A8: 9D 0D DB A9 41 99 79 07 34
C1B0: 99 80 07 C8 E8 C0 02 D0 17
C1B8: DA A0 00 E0 79 B0 08 8A D1
C1C0: 18 69 26 AA 4C 93 C1 A9 5E
C1C8: 0B 8D 20 D0 A9 0E 8D 21 B8
C1D0: D0 A9 9E 20 D2 FF A9 01 87
C1D8: 8D 15 D0 A9 A0 8D 00 D0 F4
C1E0: A9 78 8D 00 08 A9 7F 8D 4F
C1E8: 01 08 A9 64 8D 07 D0 A9 0F
C1F0: 88 8D 12 08 8D 01 D0 A9 2A
C1F8: 07 8D 17 D0 8D 1D D0 A9 9A
C200: 00 8D 29 D0 8D 28 D0 8D 9B
C208: FB 07 8D 23 08 A9 0F 8D 0A
C210: 2A D0 20 7D C4 A9 0C 8D B0
C218: 1B D0 8D 27 D0 8D 02 08 21
C220: 20 8F C4 EE 05 08 AD 05 43
C228: 08 C9 96 D0 52 A9 00 8D EA
C230: 05 08 EE 06 08 AD 06 08 F5
C238: C9 02 D0 43 A9 00 8D 06 55
C240: 08 20 C3 C3 EE 20 08 AD B4
C248: 20 08 C9 32 D0 0A A9 00 F0
C250: 8D 20 08 A2 02 20 29 C8 BC
C258: 20 E4 FF C9 20 D0 07 20 3F
C260: E4 FF C9 20 D0 F9 EE 1A 03
C268: 08 AD 1A 08 C9 02 D0 0F EB
C270: A9 00 8D 1A 08 AE FB 07 7B
C278: E0 89 F0 03 20 B2 C7 EE 60
C280: 0B 08 AD 0B 08 CD 21 08 4B
C288: D0 0F A9 00 8D 0B 08 AD 60
C290: FB 07 C9 89 F0 03 20 36 31
C298: C6 EE 18 08 AD 18 08 CD 0A
C2A0: 19 08 F0 03 4C 23 C2 A9 91
C2A8: 00 8D 18 08 AD 16 08 CD EF
C2B0: 14 08 B0 3A EE 16 08 EE B3
C2B8: 17 08 AD 1E D0 CE 03 D0 17
C2C0: AC F9 07 AD 1E D0 29 06 3A
C2C8: C9 06 D0 07 C0 8F 90 03 54
C2D0: 4C 23 C3 AE 17 08 AD 16 95
C2D8: 08 EC 13 08 D0 0A A9 00 6D
C2E0: 8D 17 08 C0 90 F0 01 C8 99
C2E8: 8C F9 07 4C 20 C3 CE 03 78
C2F0: D0 AD 1E D0 29 0A C9 0A 65
C2F8: F0 29 AD 16 08 CD 14 08 C8
C300: D0 08 A9 00 8D 17 08 EE 1E
C308: 15 08 EE 16 08 EE 17 08 40
C310: AD 17 08 CD 15 08 90 08 60
```

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C318: AD 15 D0 29 FD 8D 15 D0 46
C320: 4C 23 C2 AD FB 07 C9 89 56
C328: D0 03 4C 23 C2 A9 89 8D EE
C330: FB 07 AD 15 D0 29 F9 8D 77
C338: 15 D0 A9 00 8D 12 08 8D FC
C340: 0F 08 8D 0B D4 8D 0C D4 33
C348: 8D 18 D4 A2 0F 8E 18 D4 EF
C350: A9 81 8D 0B D4 A9 4D 8D 6D
C358: 0C D4 8E 08 D4 A9 FA 8D D6
C360: 07 D4 EE 1C 08 AD 1C 08 21
C368: D0 F8 EE 0F 08 AD 0F 08 FC
C370: C9 0F D0 EE A9 00 8D 0F 4F
C378: 08 AD 07 D0 C9 96 B0 0B 22
C380: EE 07 D0 E8 E0 14 F0 03 19
C388: 4C 62 C3 AD 15 D0 29 F7 AF
C390: 8D 15 D0 EE 22 08 AD 22 EC
C398: 08 D0 F8 A2 03 20 CB C8 C4
C3A0: AD 21 08 38 E9 05 8D 21 4D
C3A8: 08 A2 01 8E 23 08 20 D2 01
C3B0: C7 E8 20 29 C8 A2 00 20 36
C3B8: D2 C7 8E 23 08 4C 84 C1 9F
C3C0: 4C 23 C2 AD 15 D0 29 04 B3
C3C8: F0 03 20 87 C8 AD 15 D0 C0
C3D0: 29 02 D0 21 AD 00 DC 29 A1
C3D8: 10 D0 06 20 D0 C5 4C F5 B8
C3E0: C3 EE 0A 08 AD 0A 08 C9 2F
C3E8: 19 D0 0A A9 00 8D 0A 08 26
C3F0: A2 00 20 29 C8 AD 00 DC 30
C3F8: 29 0F C9 0B D0 06 20 61 5E
C400: C4 4C 57 C4 C9 07 D0 06 D4
C408: 20 68 C4 4C 57 C4 C9 0E 95
C410: D0 06 20 76 C4 4C 57 C4 AA
C418: C9 0D D0 06 20 6F C4 4C 66
C420: 57 C4 C9 09 D0 09 20 61 6A
C428: C4 20 6F C4 4C 57 C4 C9 73
C430: 05 D0 09 20 68 C4 20 6F EB
C438: C4 4C 57 C4 C9 0A D0 09 13
C440: 20 61 C4 20 76 C4 4C 57 85
C448: C4 C9 06 D0 09 20 68 C4 04
C450: 20 76 C4 4C 57 C4 60 20 94
C458: C7 C4 20 8F C4 20 7D C4 BB
C460: 60 CE 10 08 20 53 C5 60 41
C468: EE 10 08 20 80 C5 60 CE 05
C470: 11 08 CE 11 08 60 EE 11 D1
C478: 08 EE 11 08 60 AE 10 08 AF
C480: A0 00 BD BE C9 99 E0 05 E6
C488: E8 C8 C0 28 D0 F4 60 AD F6
C490: 11 08 A2 83 A0 28 38 E9 BA
C498: 06 C9 10 90 0E E8 48 98 E0
C4A0: 18 69 14 A8 68 38 E9 10 79
C4A8: 4C 99 C4 8E F8 07 8C 19 87
C4B0: 08 AE 11 08 E0 07 B0 06 1F
C4B8: E8 E8 8E 11 08 60 E0 63 D6
C4C0: 90 F8 CA CA 4C BA C4 AD 59
C4C8: FB 07 C9 89 D0 05 A9 01 9F
C4D0: 8D 22 08 AD 15 D0 29 08 4D
C4D8: F0 22 AD 06 D0 C9 4B 90 16
C4E0: 62 AD 10 D0 29 08 F0 5B 4F
```

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C4E8: AD 15 D0 29 F7 8D 15 D0 11
C4F0: AD 10 08 18 69 29 8D 12 01
C4F8: 08 4C 43 C5 AD 10 08 CD E9
C500: 12 08 D0 1D AD 15 D0 09 A4
C508: 08 8D 15 D0 A9 82 8D FB 39
C510: 07 A9 0A 8D 06 D0 AD 10 EC
C518: D0 29 F7 8D 10 D0 4C 43 08
C520: C5 18 69 28 CD 12 08 D0 48
C528: 1A AD 15 D0 09 08 8D 15 89
C530: D0 A9 81 8D FB 07 AD 10 7A
C538: D0 09 08 8D 10 D0 A9 4A 7C
C540: 8D 06 D0 AD 22 08 C9 01 47
C548: D0 08 A9 89 8D FB 07 CE B3
C550: 22 08 60 A9 08 8D 04 08 26
C558: AD 06 D0 20 70 C5 8C 06 C5
C560: D0 A9 04 8D 04 08 AD 04 2A
C568: D0 20 70 C5 8C 04 D0 60 51
C570: 18 69 06 A8 90 09 AD 10 F7
C578: D0 0D 04 08 8D 10 D0 60 31
C580: A9 08 8D 04 08 A9 F7 8D FA
C588: 1B 08 AD 06 D0 20 A7 C5 BD
C590: 8C 06 D0 A9 04 8D 04 08 3B
C598: A9 FB 8D 1B 08 AD 04 D0 71
C5A0: 20 A7 C5 8C 04 D0 60 38 28
C5A8: E9 06 A8 B0 11 AD 10 D0 91
C5B0: 2D 04 08 F0 0A AD 10 D0 73
C5B8: 2D 1B 08 8D 10 D0 60 AD 85
C5C0: 15 D0 2D 1B 08 8D 15 D0 6A
C5C8: AE 10 08 CA 8E 12 08 60 63
C5D0: A9 A0 8D 02 D0 A9 87 8D 3A
C5D8: 03 D0 A9 8A 8D F9 07 AD 1D
C5E0: 15 D0 09 02 8D 15 D0 A9 EE
C5E8: 80 38 ED 11 08 8D 15 08 53
C5F0: 4A 4A 4A 8D 13 08 0A 0A 8C
C5F8: 0A 8D 14 08 AD 15 08 38 AF
C600: ED 14 08 8D 15 08 A9 00 5E
C608: 8D 16 08 8D 17 08 8D 18 06
C610: D4 8D 05 D4 8D 04 D4 A2 55
C618: 00 20 D2 C7 A9 0D 8D 18 2F
C620: D4 A9 81 8D 04 D4 A9 1A 4A
C628: 8D 05 D4 A9 27 8D 01 D4 C3
C630: A9 FA 8D 00 D4 60 AD FB 41
C638: 07 C9 80 F0 4A C9 82 F0 02
C640: 33 CE 06 D0 AD 06 D0 C9 67
C648: FF D0 08 AD 10 D0 29 F7 D0
C650: 8D 10 D0 AD 06 D0 C9 0A 17
C658: B0 3D AD 10 D0 29 08 D0 D6
C660: 36 AC 10 08 88 88 8C 12 0B
C668: 08 AD 15 D0 29 F7 8D 15 C7
C670: D0 4C 97 C6 EE 06 D0 AD 5F
C678: 06 D0 D0 1B AD 10 D0 09 D2
C680: 08 8D 10 D0 4C 97 C6 EE 90
C688: 0C 08 AD 0C 08 C9 1E D0 17
C690: 06 AD 0D 08 8D FB 07 EE D8
C698: 0E 08 AD 0E 08 C9 8C 90 59
C6A0: 05 A9 00 8D 0E 08 AD 10 B0
C6A8: D0 29 08 D0 4F AD 06 D0 4F
C6B0: C9 82 90 68 C9 BE B0 44 73
```

```
C6B8: EE 0E 08 AD 0E 08 C9 6E B9
C6C0: D0 77 A9 00 8D 0E 08 AD 04
C6C8: FB 07 C9 82 F0 19 C9 81 6D
C6D0: D0 67 A9 82 8D 0D 08 A9 81
C6D8: 00 8D 0C 08 A9 80 8D FB 2E
C6E0: 07 20 7A C7 4C 39 C7 A9 41
C6E8: 00 8D 0C 08 A9 81 8D 0D 50
C6F0: 08 A9 80 8D FB 07 20 7A 4E
C6F8: C7 4C 39 C7 AD FB 07 C9 88
C700: 82 D0 36 AD 0E 08 C9 87 9E
C708: D0 2F A9 80 8D FB 07 A9 6C
C710: 81 8D 0D 08 A9 00 8D 0C 77
C718: 08 4C 39 C7 AD FB 07 C9 E7
C720: 81 D0 16 AD 0E 08 C9 87 9D
C728: D0 0F A9 80 8D FB 07 A9 6C
C730: 82 8D 0D 08 A9 00 8D 0C 98
C738: 08 AD 15 D0 29 08 D0 36 0C
C740: EE 07 08 AD 07 08 C9 08 CC
C748: D0 2C A9 00 8D 07 08 AD 39
C750: 12 08 CD 10 08 B0 0E AD BC
C758: 10 08 38 ED 12 08 C9 7A F4
C760: B0 0B 4C 73 C7 38 ED 10 D9
C768: 08 C9 7A B0 06 CE 12 08 54
C770: 4C 76 C7 EE 12 08 20 C7 EB
C778: C4 60 AD 15 D0 29 08 D0 33
C780: 01 60 AD 15 D0 29 04 F0 93
C788: 01 60 AD 10 D0 29 FB 8D 2B
C790: 10 D0 A9 91 8D FA 07 AD E9
C798: 06 D0 18 E9 0B 8D 04 D0 DE
C7A0: AD 07 D0 38 E9 1E 8D 05 F8
C7A8: D0 AD 15 D0 09 04 8D 15 BC
C7B0: D0 60 AD 07 D0 AA 38 E9 34
C7B8: 25 CD 11 08 B0 08 C9 0F 56
C7C0: 90 0C CA 4C CE C7 E0 86 72
C7C8: B0 04 E8 4C CE C7 8E 07 DE
C7D0: D0 60 A9 01 A0 07 85 61 3B
C7D8: 84 62 BC 00 08 B1 61 C9 61
C7E0: 48 D0 16 C0 14 90 31 98 3F
C7E8: 38 E9 28 9D 00 08 A8 A9 2B
C7F0: 41 91 61 C8 91 61 4C 03 30
C7F8: C8 B1 61 18 69 01 91 61 4A
C800: C8 91 61 AD 23 08 F0 0F 94
C808: 8A 48 A2 05 20 CB C8 20 57
C810: 2E C9 68 AA 4C D2 C7 60 62
C818: AD 23 08 D0 FA E0 02 F0 90
C820: F6 20 14 C9 68 68 4C 1A 4C
C828: C1 A9 01 A0 07 85 61 84 A7
C830: 62 BC 00 08 B1 61 C9 41 75
C838: D0 1D C0 64 B0 38 A9 20 FD
C840: 91 61 C8 91 61 98 18 69 09
C848: 27 9D 00 08 A8 A9 48 91 41
C850: 61 C8 91 61 4C 61 C8 B1 95
C858: 61 38 E9 01 91 61 C8 91 2A
C860: 61 AD 23 08 F0 0F 8A 48 6D
C868: A2 05 20 CB C8 20 2E C9 DC
C870: 68 AA 4C 29 C8 60 AD 23 F2
C878: 08 D0 FA E0 02 D0 F6 20 17
C880: 14 C9 68 68 4C 1A C1 AD 05
C888: FA 07 C9 8A F0 13 EE 09 DA
C890: 08 CE FA 07 AD 09 08 C9 F1
C898: 05 D0 05 A9 00 8D 09 08 BB
C8A0: 60 A2 01 20 D2 C7 AD 15 22
C8A8: D0 29 FB 8D 15 D0 A9 00 BB
C8B0: 8D 12 D4 A2 0F 8E 18 D4 52
C8B8: A9 81 8D 12 D4 A9 39 8D C8
C8C0: 13 D4 8E 0F D4 A9 FA 8D 4D
C8C8: 0E D4 60 BD EB 06 C9 39 BE
C8D0: F0 04 FE EB 06 60 E0 00 F7
C8D8: D0 01 60 A9 30 9D EB 06 74
C8E0: CA 4C CB C8 A2 00 A0 00 CF
C8E8: A9 07 8D 00 08 98 EC 00 B4
C8F0: 08 F0 08 99 08 32 C8 E8 77
C8F8: 4C EE C8 E0 08 D0 09 A2 62
C900: 00 8A CE 00 08 4C EE C8 65
C908: E8 A9 FF 99 08 32 C8 C0 F7
C910: 40 90 E8 60 A2 67 A0 C9 9E
C918: 86 61 84 62 20 3D C9 AD BB
C920: 00 DC 29 10 C9 10 F0 F7 F8
C928: A9 00 8D 15 D0 60 A9 00 4F
C930: AA A8 E8 E0 00 D0 FB C8 E2
C938: C0 0F D0 F6 60 A9 00 85 5F
C940: 63 A4 63 B1 61 C8 AA E0 13
C948: 19 F0 1B B1 61 E6 63 E6 B1
C950: 63 A8 18 20 F0 FF A4 63 8D
C958: B1 61 E6 63 C9 0D F0 E1 5F
C960: 20 D2 FF 4C 56 C9 60 08 28
C968: 0F 01 47 41 4D 45 20 4F 03
C970: 56 45 52 0D 19 49 00 00 CD
C978: 00 00 00 00 0F FF 4A 00 D1
C980: 00 00 00 0F FF FF FF 4B DA
C988: 00 00 0F FF FF FF FF FF 97
C990: 4C 0F FF FF FF FF FF FF EB
C998: FF 4D F0 FF FF FF FF FF D6
C9A0: FF FF 4E 00 00 F0 FF FF DF
C9A8: FF FF FF 4F 00 00 00 00 F7
C9B0: F0 FF FF FF 50 00 00 00 F1
C9B8: 00 00 00 F0 FF 00 64 42 50
C9C0: 79 62 F8 F7 F8 62 4B 4C 80
C9C8: 4D 4E 4F 50 20 20 49 4A D7
C9D0: 4F 42 79 62 F8 F7 E3 A0 B3
C9D8: E3 F7 F8 F7 F8 F7 E3 F7 72
C9E0: F8 62 79 42 64 20 49 4A 10
C9E8: 4B 4E 4F 4A 4B 4E 4F 50 55
C9F0: 20 64 42 79 62 F8 F7 E3 68
C9F8: F7 F8 F7 E3 A0 E3 F7 F8 3B
CA00: 62 79 42 64 20 49 4A 4B 81
CA08: 4C 4D 4E 4F 4A 4B 4E 4F 72
CA10: 42 79 62 F8 F7 E3 A0 E3 87
CA18: F7 E3 A0 E3 F7 F8 62 79 45
CA20: 42 64 20 64 42 79 62 F8 62
CA28: F7 E3 A0 E3 F7 F8 4B 4C 11
CA30: 4D 4E 4F 50 64 64 64 42 DA
CA38: 64 64 42 79 62 F8 F7 E3 F3
CA40: F7 F8 62 79 42 64 20 49 1D
CA48: 4A 4B 4E 4F 42 79 62 F8 92
CA50: F7 F8 62 62 79 42 64 49 6F
```

```
CA58: 42 4A 4B 4E 4F 50 20 20 5E
CA60: 64 42 79 62 F8 F7 E3 F7 AF
CA68: F8 62 79 42 79 62 F8 62 B6
CA70: 79 42 64 20 49 4A 4B 4E DD
CA78: 4F 4A 4B 4C 4D 4E 4F 50 E4
CA80: 20 49 4A 4B 4C 4D 4E 4F B6
CA88: 42 79 62 F8 F7 F8 62 79 6C
CA90: 42 49 4A 4B 4E 4F 50 20 BF
CA98: 49 4A 4B 4C 4D 4E 4F 4A F8
CAA0: 4B 4E 4F 50 20 64 42 79 1A
CAA8: 62 F8 F7 E3 A0 E3 F7 F8 55
CAB0: 62 79 42 49 4A 4F 50 20 22
CAB8: 64 42 79 42 64 42 00 00 C1
CAC0: 00 00 00 00 00 10 00 00 D0
CAC8: 10 00 00 10 00 00 10 00 F8
CAD0: 00 38 00 00 C6 00 FF 83 53
CAD8: FE 30 FE 18 00 38 00 00 57
CAE0: 00 00 00 00 00 00 00 00 E0
CAE8: 00 00 00 00 00 00 00 00 E8
CAF0: 00 00 00 00 00 00 00 00 F0
CAF8: 00 00 00 00 00 32 00 00 2B
CB00: 00 00 00 00 00 00 00 00 00
CB08: 00 00 00 00 07 00 00 0F 1E
CB10: 00 00 1E 0F FF FF 33 FF 70
CB18: FF FF FF F8 00 FF C0 00 D1
CB20: 00 00 00 00 00 00 00 00 20
CB28: 00 00 00 00 00 00 00 00 28
CB30: 00 00 00 00 00 00 00 00 30
CB38: 00 00 00 00 00 00 00 00 38
CB40: 00 00 00 00 00 00 00 00 40
CB48: 00 00 E0 00 00 F0 00 00 1A
CB50: 78 00 00 FF FF F0 FF FF B9
CB58: CC 1F FF FF 03 FF 00 00 47
CB60: 00 00 00 00 00 00 00 00 60
CB68: 00 00 00 00 00 00 00 00 68
CB70: 00 00 00 00 00 00 00 00 70
CB78: 00 00 00 00 00 00 00 00 78
CB80: 00 00 00 00 00 00 00 00 80
CB88: 00 00 00 00 00 00 00 00 88
CB90: 00 00 00 00 00 00 00 00 90
CB98: 00 06 00 60 0F 00 F0 0F 0E
CBA0: 00 F0 0F 00 F0 1E 00 78 28
CBA8: 1E 00 78 1E 00 78 3E 00 14
CBB0: 7C 3C 00 3C 3C 00 3C 7C 9A
CBB8: 00 3E 7C 00 3E 08 00 00 B9
CBC0: 00 00 00 00 00 00 00 00 C0
CBC8: 00 00 00 00 00 00 00 00 C8
CBD0: 00 00 00 00 00 00 00 00 D0
CBD8: 00 00 00 00 06 00 60 0F 4E
CBE0: 00 F0 0F 00 F0 1F 00 F8 E9
CBE8: 1E 00 78 1E 00 78 3E 00 54
CBF0: 7C 3E 00 7C 3C 00 3C 7C 1D
CBF8: 00 3E 7C 00 3E 08 00 00 F9
CC00: 00 00 00 00 00 00 00 00 00
CC08: 00 00 00 00 00 00 00 00 08
CC10: 00 00 00 00 00 00 00 00 10
CC18: 00 00 00 00 00 00 00 06 1E
CC20: 00 60 0F 00 F0 0F 00 F0 80
CC28: 1F 00 F8 1E 00 78 1E 00 F4
CC30: 78 3E 00 7C 3C 00 3C 7C 58
CC38: 00 3E 7C 00 3E 7C 00 00 AD
CC40: 00 00 00 00 00 00 00 00 40
CC48: 00 00 00 00 00 00 00 00 48
CC50: 00 00 00 00 00 00 00 00 50
CC58: 00 00 00 00 00 00 00 00 58
CC60: 00 00 06 00 60 0F 00 F0 C6
CC68: 0F 00 F0 1E 00 78 1E 00 1D
CC70: 78 3E 00 7C 3C 00 3C 7C 98
CC78: 00 3E 7C 00 3E 3E 00 00 AF
CC80: 00 00 00 00 00 00 00 00 80
CC88: 00 00 00 00 00 00 00 00 88
CC90: 00 00 00 00 00 00 00 00 90
CC98: 00 00 00 00 00 00 00 00 98
CCA0: 00 00 00 00 00 06 00 60 07
CCA8: 0F 00 F0 1F 00 F8 1E 00 DE
CCB0: 78 3E 00 7C 3E 00 7C 7C 1B
CCB8: 00 3E 7C 00 3E 90 00 00 42
CCC0: 00 00 00 00 00 00 00 00 C0
CCC8: 00 00 00 00 00 00 00 00 C8
CCD0: 00 00 00 00 00 00 00 00 D0
CCD8: 00 00 00 00 00 00 00 00 D8
CCE0: 00 00 00 00 00 00 00 00 E0
CCE8: 06 00 60 0F 00 F0 1F 00 6E
CCF0: F8 3E 00 7C 3E 00 7C 7C DB
CCF8: 00 3E 7C 00 3E 00 00 00 F1
CD00: 00 00 00 00 00 01 00 20 21
CD08: 20 00 00 04 00 00 01 00 2D
CD10: 04 58 04 00 24 80 20 BE F3
CD18: 00 00 7F 02 02 3F 50 00 2B
CD20: 7E 00 81 0C 80 08 56 20 2B
CD28: 00 01 08 00 88 00 00 02 BB
CD30: 00 44 08 00 00 80 40 00 3D
CD38: 00 00 00 04 00 0C 00 30 78
CD40: 0C 00 30 0C 00 30 0C 00 C4
CD48: 30 00 02 00 40 06 00 60 21
CD50: 06 00 60 06 00 60 00 00 1D
CD58: 00 00 03 00 C0 03 00 C0 DF
CD60: 03 00 C0 00 00 00 00 00 24
CD68: 81 00 01 81 80 01 81 80 EF
CD70: 00 00 00 00 00 00 00 00 70
CD78: C3 00 00 C3 00 00 00 00 FF
CD80: 00 00 00 00 00 24 00 00 A4
CD88: 66 00 00 00 00 00 00 00 EE
CD90: 00 00 00 00 00 3C 00 00 CC
CD98: 00 00 00 00 00 00 00 00 98
CDA0: 00 00 18 00 00 02 05 9E 5E
CDA8: 41 20 48 41 52 53 48 2C AD
CDB0: 46 4F 52 42 49 44 44 49 F5
CDB8: 4E 47 20 44 45 53 45 52 E2
CDC0: 54 2C 0D 04 02 41 4E 44 28
CDC8: 20 41 20 4D 49 53 53 49 D0
CDD0: 4F 4E 20 54 48 41 54 20 E0
CDD8: 49 53 20 4C 49 4B 45 4C 08
CDE0: 59 20 54 4F 20 46 41 49 EE
CDE8: 4C 0D 06 02 49 53 20 54 5B
CDF0: 48 45 20 53 45 54 54 49 29
```

**IMPORTANT!** Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 93 and 94 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
CDF8: 4E 47 20 46 4F 52 20 41 F7
CE00: 20 42 41 54 54 4C 45 20 FD
CE08: 4F 4E 20 54 48 45 2E 2E 04
CE10: 2E 0D 13 0A 50 52 45 53 A3
CE18: 53 20 46 49 52 45 20 54 27
CE20: 4F 20 42 45 47 49 4E 20 16
CE28: 42 41 54 54 4C 45 2E 2E 42
CE30: 2E 0D 19 19 08 03 C8 A3 15
CE38: C8 A1 20 C8 A3 C8 20 C8 E0
CE40: A3 C8 20 C8 A3 C8 20 C8 EA
CE48: A3 DF 12 7F A5 92 A3 C8 02
CE50: C8 C8 0D 09 03 C8 20 20 04
CE58: C8 20 C8 20 B9 20 C8 20 EC
CE60: 20 20 C8 20 B9 20 C8 20 4C
CE68: 20 C8 20 20 C8 0D 0A 03 74
CE70: C8 20 20 C8 20 C8 20 B8 04
CE78: 20 A3 A3 C8 20 C8 20 B8 6A
CE80: 20 C8 20 12 A9 92 A9 20 A1
CE88: 20 C8 0D 0B 03 C8 A4 C8 C2
CE90: A1 20 C8 A4 C8 20 C8 A4 16
CE98: C8 20 C8 A4 C8 20 C8 A3 44
CEA0: DF 12 7F 92 20 20 C8 0D BA
CEA8: 0D 09 C8 A3 C8 20 C8 A3 80
CEB0: DF 12 7F 92 20 C8 A3 C8 0A
CEB8: C8 20 C8 20 20 C8 12 A5 2B
CEC0: 92 A3 C8 C8 C8 0D 0E 09 75
CEC8: C8 20 20 20 C8 20 20 C8 C3
CED0: B6 C8 20 20 C8 B5 C8 20 F7
CED8: 12 7F 92 C8 20 20 C8 0D DB
CEE0: 0F 09 C8 20 C8 20 C8 20 B3
CEE8: 12 A9 92 A9 B6 C8 20 20 A0
CEF0: C8 B5 C8 20 DF C8 20 20 41
CEF8: C8 0D 10 09 C8 20 20 20 11
CF00: C8 A3 DF 12 7F 92 20 C8 59
CF08: A4 C8 C8 20 C8 20 20 DF 47
CF10: 20 20 C8 0D 19 19 11 07 70
CF18: 97 54 45 4D 50 0D 11 0C 11
CF20: 44 41 4D 41 47 45 0D 11 DE
CF28: 13 54 49 4D 45 0D 11 1B A4
CF30: 53 43 4F 52 45 0D 19 FF D3
CF38: FF 38
```

# A-MAZE-ING
## FROM PAGE 60

**C-64 VERSION**

```
•60000 REM *** C-64 VERSION ***                MF
•60002 FORJ=52800TO53183:READA:POKEJ,A:X=
 X+A:NEXTJ                                     JI
•60004 IFX<>51326THENPRINT"ERROR IN DATA[
 3"."]":END                                    MI
•60006 DATA169,11,141,17,208,32,68,229,16
 9,17,32,210                                   MF
•60008 DATA255,169,23,133,251,169,146,160
 ,207,32,30,171                                FN
•60010 DATA198,251,208,245,169,81,162,4,1
 33,253,134,254                                CE
•60012 DATA141,81,4,165,253,166,254,133,2
 51,134,252,32                                 PE
•60014 DATA190,224,165,140,69,141,69,142,
 69,143,162,0                                  AM
•60016 DATA201,64,144,11,232,201,128,144,
 6,232,201,192                                 KG
•60018 DATA144,1,232,142,188,207,142,189,
 207,165,253,166                               DG
•60020 DATA254,141,190,207,142,191,207,16
 0,0,173,188,207                               PC
•60022 DATA208,26,165,251,24,105,2,32,128
 ,207,165,251                                  MN
•60024 DATA24,105,1,133,251,144,2,230,252
 ,169,32,145                                   HJ
•60026 DATA251,76,103,206,201,1,208,22,16
 5,251,56,233                                  OO
•60028 DATA80,32,137,207,165,251,56,233,4
 0,133,251,176                                 MD
•60030 DATA2,198,252,76,181,206,201,2,208
 ,16,165,251                                   DL
•60032 DATA56,233,2,32,137,207,165,251,56
 ,233,1,76                                     KH
•60034 DATA205,206,165,251,24,105,80,32,1
 28,207,165,251                                PP
•60036 DATA24,105,40,76,175,206,177,253,2
 01,160,208,6                                  DP
•60038 DATA173,188,207,145,253,96,104,104
 ,173,190,207,133                              HJ
•60040 DATA253,173,191,207,133,254,238,18
 8,207,173,188,207                             EF
•60042 DATA201,4,144,5,169,0,141,188,207,
 173,188,207                                   GH
•60044 DATA205,189,207,240,3,76,145,206,1
 77,251,170,169                                II
•60046 DATA32,145,251,224,4,144,6,169,27,
 141,17,208                                    IK
•60048 DATA96,224,0,208,11,165,251,56,233
 ,2,133,251                                    BG
•60050 DATA176,43,144,39,224,1,208,8,165,
 251,24,105                                    HG
•60052 DATA80,76,97,207,224,2,208,14,165,
 251,24,105                                    FC
•60054 DATA2,133,251,144,16,230,252,76,11
 7,207,165,251                                 BA
•60056 DATA56,233,80,133,251,176,2,198,25
 2,165,251,166                                 NC
•60058 DATA252,133,253,134,254,76,111,206
 ,133,253,144,2                                JE
•60060 DATA230,254,76,250,206,133,253,176
 ,2,198,254,76                                 MH
•60062 DATA250,206,18,32,32,32,32,32,32,3
 2,32,32                                       PO
•60064 DATA32,32,32,32,32,32,32,32,32,32,
 32,32                                         JA
```

```
•60066 DATA32,32,32,32,32,32,32,32,32,32,
 32,32                                     EG
•60068 DATA32,32,32,32,32,32,13,0,0,65,72
 ,83                                       MC
```

**C-128 VERSION**

```
•60000 REM *** C-128 VERSION ***           DN
•60002 FORJ=6700TO7083:READA:POKEJ,A:X=X+
 A:NEXTJ                                   FP
•60004 IFX<>45169THENPRINT"ERROR IN DATA[
 3"."]":END                                OI
•60006 DATA169,0,141,0,255,169,11,141,17,
 208,32,125                                CC
•60008 DATA255,147,17,0,169,23,133,251,32
 ,125,255,18                               MJ
•60010 DATA32,32,32,32,32,32,32,32,32,32,
 32,32                                     CO
•60012 DATA32,32,32,32,32,32,32,32,32,32,
 32,32                                     NE
•60014 DATA32,32,32,32,32,32,32,32,32,32,
 32,32                                     NK
•60016 DATA32,32,32,13,0,198,251,208,207,
 169,81,162                                MJ
•60018 DATA4,133,253,134,254,141,81,4,165
 ,253,166,254                              AD
•60020 DATA133,251,134,252,32,87,175,173,
 28,18,77,29                               KD
•60022 DATA18,77,30,18,77,31,18,162,0,201
 ,64,144                                   EC
•60024 DATA11,232,201,128,144,6,232,201,1
 92,144,1,232                              JJ
•60026 DATA142,171,27,142,172,27,165,253,
 166,254,141,173                           BF
•60028 DATA27,142,174,27,160,0,173,171,27
 ,208,26,165                               LE
•60030 DATA251,24,105,2,32,153,27,165,251
 ,24,105,1                                 OC
•60032 DATA133,251,144,2,230,252,169,32,1
 45,251,76,124                             FB
•60034 DATA26,201,1,208,22,165,251,56,233
 ,80,32,162                                IE
•60036 DATA27,165,251,56,233,40,133,251,1
 76,2,198,252                              JM
•60038 DATA76,206,26,201,2,208,16,165,251
 ,56,233,2                                 LG
•60040 DATA32,162,27,165,251,56,233,1,76,
 230,26,165                                KE
•60042 DATA251,24,105,80,32,153,27,165,25
 1,24,105,40                               NA
•60044 DATA76,200,26,177,253,201,160,208,
 6,173,171,27                              IL
•60046 DATA145,253,96,104,104,173,173,27,
 133,253,173,174                           NN
•60048 DATA27,133,254,238,171,27,173,171,
 27,201,4,144                              GL
•60050 DATA5,169,0,141,171,27,173,171,27,
 205,172,27                                PF
•60052 DATA240,3,76,170,26,177,251,170,16
 9,32,145,251                              AE
•60054 DATA224,4,144,6,169,27,141,17,208,
 96,224,0                                  NB
•60056 DATA208,11,165,251,56,233,2,133,25
 1,176,43,144                              GO
•60058 DATA39,224,1,208,8,165,251,24,105,
 80,76,122                                 PJ
•60060 DATA27,224,2,208,14,165,251,24,105
 ,2,133,251                                PC
•60062 DATA144,16,230,252,76,142,27,165,2
 51,56,233,80                              NC
•60064 DATA133,251,176,2,198,252,165,251,
 166,252,133,253                           GM
•60066 DATA134,254,76,132,26,133,253,144,
 2,230,254,76                              IP
•60068 DATA19,27,133,253,176,2,198,254,76
 ,19,27,220                                EI
```

**ROLLING BALL DEMO—C-64**

```
•0 REM *** ROLLING BALL DEMO ... C-64 *** JG
•1 POKE53280,0:POKE53281,0:PRINTCHR$(158) NJ
•2 SYS52800:A=1105:X(1)=1:X(2)=-40:X(3)=-
 1:X(4)=40:POKEA,81                        GF
•3 B=A+X(C):IFPEEK(B)=32THENPOKEB,81:POKE
 A,32:A=B:C=C+2:IFC>4THENC=C-4             NJ
•4 C=C-1:IFC<0THENC=4                      PF
•5 GOTO3                                   MF
```

**ROLLING BALL DEMO—C-128**

```
•0 REM *** ROLLING BALL DEMO ... C-128 **
 *                                         OJ
•1 POKE53280,0:POKE53281,0:PRINTCHR$(158) NJ
•2 SYS6700:A=1105:X(1)=1:X(2)=-40:X(3)=-1
 :X(4)=40:POKEA,81                         LK
•3 B=A+X(C):IFPEEK(B)=32THENPOKEB,81:POKE
 A,32:A=B:C=C+2:IFC>4THENC=C-4             NJ
•4 C=C-1:IFC<0THENC=4                      PF
•5 GOTO3                                   MF
```

# PAPER ROUTE
## FROM PAGE 48

**Starting address in hex: C000**
**Ending address in hex: C8FE**
**SYS to start: 49152**

***Flankspeed*** **required for entry! See page 95.**

```
C000: 20 67 C5 20 B0 C8 20 14 1B
C008: C5 20 81 C3 20 E5 C1 20 1B
C010: 87 C0 20 E4 FF F0 FB A2 EC
C018: 00 A9 A0 9D 83 06 A9 00 33
C020: 9D 83 DA E8 E0 21 D0 F1 C9
C028: 20 62 C3 20 CD C1 20 FB 3A
C030: C2 AD 82 C1 F0 03 4C AE D3
C038: C2 AD FD C8 F0 06 20 9B 22
```

```
C040: C0 4C 2B C0 AD 00 DC C9 8D
C048: 6F D0 E0 AD 83 C1 C9 05 2B
C050: F0 D9 EE 83 C1 A9 01 8D 87
C058: FD C8 AE 83 C1 BD 69 C1 FB
C060: AA A9 BA 9D 00 D0 A9 86 0E
C068: 9D 01 D0 A9 E3 8D FF 07 F9
C070: AE 83 C1 AD 15 D0 5D 6F C4
C078: C1 8D 15 D0 A9 01 8D FC E2
C080: C8 9D 75 C1 4C 2B C0 A2 F8
C088: 00 BD CF C4 9D 83 06 A9 AB
C090: 01 9D 83 DA E8 E0 21 D0 49
C098: F0 60 60 EE FA C8 AD FA A5
C0A0: C8 C9 02 D0 F5 A9 00 8D 33
C0A8: FA C8 AD FC C8 F0 25 AE A4
C0B0: 83 C1 BD 69 C1 AA DE 01 69
C0B8: D0 FE 00 D0 FE 00 D0 EE 18
C0C0: FB C8 AD FB C8 C9 06 D0 98
C0C8: 08 A9 00 8D FC C8 8D FB 57
C0D0: C8 4C 18 C1 AE 83 C1 BD 71
C0D8: 69 C1 AA DE 01 D0 DE 00 3E
C0E0: D0 DE 00 D0 EE FB C8 AD C2
C0E8: FB C8 C9 06 D0 2A A9 00 22
C0F0: 8D FB C8 8D FD C8 AE 83 C9
C0F8: C1 A9 01 9D 7B C1 A9 E0 CA
C100: 8D FF 07 AD 7C 05 8D 81 D2
C108: C1 20 84 C1 AD 20 89 8D 15
C110: F8 89 AD 21 89 8D F9 89 FB
C118: AE 83 C1 FE F8 07 BD F8 C1
C120: 07 C9 E6 D0 05 A9 E4 9D D9
C128: F8 07 60 06 A9 00 8D 2B F0
C130: C1 AE 2B C1 BD 7B C1 D0 59
C138: 0B EE 2B C1 AD 2B C1 C9 83
C140: 06 D0 EE 60 BD 69 C1 AA F9
C148: DE 00 D0 BD 00 D0 C9 18 68
C150: D0 E7 AE 2B C1 AD 15 D0 38
C158: 5D 6F C1 8D 15 D0 AE 2B 34
C160: C1 A9 00 9D 7B C1 4C 39 2C
C168: C1 00 02 04 06 08 0A 01 49
C170: 02 04 08 10 20 00 00 00 AE
C178: 00 00 00 00 00 00 00 00 78
C180: 00 98 00 FF AD 81 C1 C9 D3
C188: 97 D0 01 60 AD 81 C1 C9 0D
C190: 98 D0 01 60 EE FE C8 EE 01
C198: 21 89 AD 21 89 C9 3A F0 90
C1A0: 01 60 A9 30 8D 21 89 EE 03
C1A8: 20 89 60 EE 11 89 AD 11 FA
C1B0: 89 C9 3A F0 03 4C C0 C1 01
C1B8: A9 30 8D 11 89 EE 10 89 43
C1C0: AD 10 89 8D E8 89 AD 11 C6
C1C8: 89 8D E9 89 60 EE F8 C8 64
C1D0: AD F8 C8 D0 F8 EE F7 C8 B9
C1D8: AD F7 C8 C9 08 D0 EE A9 82
C1E0: 00 8D F7 C8 60 A2 0B A9 E6
C1E8: A0 8D FC C1 A9 04 8D FD 0F
C1F0: C1 A9 80 8D FA C1 A0 27 EE
C1F8: B9 11 8B 99 58 06 88 10 DF
C200: F7 EE FA C1 AD FC C1 18 28
C208: 69 28 8D FC C1 AD FD C1 53
C210: 69 00 8D FD C1 CA D0 DE 41
C218: 60 AD FD C8 D0 1E EE F9 C4
C220: C8 AD F9 C8 C9 08 D0 14 10
C228: A9 00 8D F9 C8 EE FF 07 18
C230: AD FF 07 C9 E3 D0 05 A9 12
C238: E0 8D FF 07 AD 19 D0 29 6E
C240: 01 F0 42 8D 19 D0 20 2C 38
C248: C1 CE 16 D0 AD 16 D0 C9 1E
C250: D0 D0 2F EE F9 C1 AD F9 73
C258: C1 C9 D8 D0 1A 20 AB C1 35
C260: 20 88 C2 AD FE C8 C9 0C 17
C268: 90 03 EE 82 C1 A9 FF 8D 66
C270: 83 C1 A9 00 8D F9 C1 20 C8
C278: E5 C1 20 2C C1 A9 D7 8D 3D
C280: 16 D0 4C BC FE 4C 31 EA D7
C288: A2 00 BD 75 C1 D0 03 20 14
C290: 94 C1 E8 E0 06 D0 F3 A2 1E
C298: 00 8A 9D 75 C1 9D 7B C1 D2
C2A0: E8 E0 06 D0 F5 8D FD C8 8B
C2A8: A9 80 8D 15 D0 60 AD 11 65
C2B0: D0 09 80 8D 11 D0 78 A9 9C
C2B8: 31 8D 14 03 A9 EA 8D 15 C5
C2C0: 03 58 20 87 C0 A2 07 8E BC
C2C8: 03 D4 8E 94 DA 8E 95 DA 9D
C2D0: 8E 96 DA 8E 97 DA 20 E4 D6
C2D8: FF F0 03 4C EE C2 20 CD B8
C2E0: C1 20 FB C2 CA E0 00 D0 FD
C2E8: DE A2 07 4C C7 C2 20 14 7C
C2F0: C5 20 81 C3 4C 28 C0 00 51
C2F8: 00 00 60 EE F9 C2 AD F9 AC
C300: C2 C9 04 D0 F5 A9 00 8D 8E
C308: F9 C2 AD F8 C2 D0 43 EE 31
C310: F8 C2 AC F6 C8 B9 1A C8 D4
C318: A8 B9 9A C8 8D 00 D4 B9 F9
C320: A5 C8 8D 01 D4 AC F6 C8 5E
C328: B9 5A C8 A8 B9 9A C8 8D 58
C330: 07 D4 B9 A5 C8 8D 08 D4 9E
C338: A9 41 8D 04 D4 A9 21 8D E1
C340: 0B D4 EE F6 C8 AD F6 C8 3C
C348: C9 40 D0 AE A9 00 8D F6 FF
C350: C8 60 A9 20 8D 04 D4 A9 53
C358: 10 8D 0B D4 A9 00 8D F8 06
C360: C2 60 78 A9 81 8D 1A D0 9F
C368: A9 A0 8D 12 D0 A9 19 8D 73
C370: 14 03 A9 C2 8D 15 03 58 F1
C378: AD 11 D0 29 7F 8D 11 D0 20
C380: 60 A9 00 8D F6 C8 8D F7 5D
C388: C8 8D F8 C8 8D F9 C8 8D 7E
C390: FA C8 8D FB C8 8D FD C8 FA
C398: 8D 82 C1 8D FE C8 8D F9 47
C3A0: C1 A9 FF 8D 83 C1 A2 00 81
C3A8: A9 E4 9D F8 07 A9 00 9D 1C
C3B0: 7B C1 9D 75 C1 E8 E0 06 92
C3B8: D0 EE 60 A2 00 A9 20 9D E2
C3C0: 00 80 E8 E0 00 D0 F8 EE C3
C3C8: C1 C3 AD C1 C3 C9 8E D0 AA
C3D0: EA A9 80 8D C1 C3 A2 00 9B
C3D8: A9 92 9D 00 88 A9 91 9D 14
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C3E0: 00 87 E8 A9 93 9D 00 88 B4
C3E8: A9 91 9D 00 87 E8 E0 00 13
C3F0: D0 E6 A2 00 A9 A0 9D 00 33
C3F8: 86 9D 00 85 9D 58 06 9D 3C
C400: E8 06 A9 00 9D 58 DA 9D 07
C408: E8 DA E8 E0 00 D0 E5 A2 EE
C410: 00 BD B7 C4 9D 0A 89 9D 19
C418: E2 89 E8 E0 18 D0 F2 A2 CC
C420: 00 A0 00 B9 04 C8 9D 00 E4
C428: 8A C8 C0 0C D0 02 A0 00 BB
C430: E8 E0 00 D0 EE A2 00 A0 FC
C438: 00 B9 A4 C7 9D 28 80 B9 5E
C440: B0 C7 9D 28 81 B9 BC C7 3E
C448: 9D 28 82 B9 C8 C7 9D 28 A0
C450: 83 B9 D4 C7 9D 28 84 B9 2E
C458: E0 C7 9D 28 85 B9 EC C7 BA
C460: 9D 28 86 B9 F8 C7 9D 28 EC
C468: 87 E8 C8 C0 0C D0 07 A0 E6
C470: 00 18 8A 69 14 AA E0 C0 DC
C478: D0 BF A9 00 8D F7 C8 A9 AA
C480: 83 8D 96 C4 AE F7 C8 BD 1A
C488: B1 C4 8D 95 C4 A2 00 A0 2A
C490: 00 BD 10 C8 99 CB 88 E8 FD
C498: C8 C0 02 D0 05 A0 00 EE 89
C4A0: 96 C4 E0 0A D0 EB EE F7 8A
C4A8: C8 AD F7 C8 C9 06 D0 CF 50
C4B0: 60 2B 4C 6D 8B AC CB 02 FB
C4B8: 0C 0F 03 0B 20 30 30 20 82
C4C0: 20 20 03 0F 0D 10 0C 01 3D
C4C8: 09 0E 14 13 20 30 30 10 97
C4D0: 12 05 13 13 20 01 0E 19 56
C4D8: 20 0B 05 19 20 14 0F 20 85
C4E0: 10 0C 01 19 20 10 01 10 58
C4E8: 05 12 20 12 0F 15 14 05 6F
C4F0: 10 01 10 05 12 20 20 12 7B
C4F8: 0F 15 14 05 20 20 20 20 B6
C500: 20 02 19 20 20 20 20 20 DB
C508: 02 0F 02 20 02 0C 01 03 4D
C510: 0B 0D 05 12 A9 93 20 D2 6F
C518: FF A2 00 BD 75 C7 9D 00 53
C520: D0 E8 E0 2F D0 F5 A2 00 53
C528: BD 94 C6 9D 00 D4 E8 E0 7D
C530: 19 D0 F5 A2 00 A9 0F 9D 09
C538: F0 D8 9D 18 D9 A9 08 9D E0
C540: A0 D8 E8 E0 50 D0 EE A2 36
C548: 00 A9 0D 9D 68 D9 A9 0F 97
C550: 9D E0 D9 E8 E0 78 D0 F1 AD
C558: A2 00 A9 00 9D 08 DA E8 0E
C560: E0 28 D0 F6 4C BB C3 AD AA
C568: 0E DC 29 FE 8D 0E DC A5 99
C570: 01 29 FB 85 01 A2 00 BD 7D
C578: 00 D0 9D 00 30 E8 E0 00 E0
C580: D0 F5 EE 79 C5 EE 7C C5 A6
C588: AD 7C C5 C9 37 D0 E6 A9 DA
C590: 30 8D 7C C5 A9 D0 8D 79 12
C598: C5 A5 01 09 04 85 01 AD 46
C5A0: 0E DC 09 01 8D 0E DC A2 B0
C5A8: 00 BD AD C6 9D 00 34 E8 95
C5B0: E0 C8 D0 F5 A2 00 8A 9D EB
C5B8: 00 38 9D C0 38 E8 E0 C0 12
C5C0: D0 F5 A2 00 BD 13 C6 9D 5F
C5C8: 00 38 9D 40 38 9D 80 38 6D
C5D0: BD 38 C6 9D C0 38 E8 E0 ED
C5D8: 25 D0 E9 A2 00 BD 5D C6 3D
C5E0: 9D 25 38 BD 68 C6 9D 65 CB
C5E8: 38 9D E5 38 BD 73 C6 9D 72
C5F0: A5 38 BD 7E C6 9D 00 39 A8
C5F8: BD 89 C6 9D 40 39 E8 E0 E7
C600: 0B D0 DA A9 95 8D 9F 38 5B
C608: A9 81 8D A2 38 A9 E0 8D B3
C610: FF 07 60 00 00 00 00 C0 38
C618: 00 03 80 00 03 80 00 02 21
C620: 00 00 02 80 00 02 20 00 C4
C628: 02 0C 00 06 01 00 2E 85 F0
C630: 00 2A 65 00 2A 21 40 2A 75
C638: 00 00 00 00 C0 00 03 80 7C
C640: 00 03 80 00 02 0C 00 02 D3
C648: A0 00 02 80 00 02 0C 00 79
C650: 06 01 00 2A 85 00 2A 65 96
C658: 00 2A 21 40 2A 74 30 DD 90
C660: 10 CC DC 00 DC 30 00 30 57
C668: 64 30 DD 30 DC CC 00 DC 91
C670: 30 00 30 84 30 DD 90 DC D0
C678: DC C0 DC 30 00 30 08 00 5B
C680: 00 28 00 00 A0 00 00 80 C9
C688: 00 80 00 00 A0 00 00 28 D1
C690: 00 00 08 00 00 00 00 0A A2
C698: 00 09 0A 00 00 00 00 00 AB
C6A0: 08 9A FF FF 00 00 80 00 C3
C6A8: 00 00 00 00 0F 00 01 07 BF
C6B0: 1D 77 DD AA 56 77 DD 77 F0
C6B8: DD 77 DD AA 55 00 C0 70 1D
C6C0: DC 77 DD AA 55 56 56 52 F1
C6C8: 56 56 46 56 56 55 45 51 54
C6D0: 55 55 55 54 55 55 51 55 76
C6D8: 55 45 51 55 55 00 00 00 6F
C6E0: 00 00 01 07 1D 28 3C 3C A6
C6E8: 3C 77 DD 77 DD 00 00 00 CF
C6F0: 00 77 DD 77 DD 00 00 00 9B
C6F8: 00 00 C0 70 DC 00 00 00 07
C700: FF 00 00 00 00 6A 6F 6C 46
C708: 6C 6C 6F 6F 6F A9 F9 39 0C
C710: 39 29 F9 F9 F9 6F 63 6F A2
C718: 6F 6F 6F 6F 6A F9 F9 F9 2E
C720: F9 F9 F9 F9 A9 6A 67 6D F0
C728: 67 6A 60 60 6A AA 76 DE 25
C730: 76 AA C2 02 AA EE EE AA 49
C738: EE EE AA 22 22 AA AA AA 05
C740: AA AA AA AA 55 A9 A9 A9 3D
C748: A9 A9 A9 A9 55 A9 A9 A9 41
C750: A9 A9 A9 A9 A9 6A 6A 6A DF
C758: 6A 6A 6A 6A 6A 6A 6A 6A AB
C760: 6A 6A 6A 6A 55 F7 F6 DA 29
C768: DA 6A 55 6A 55 DF 9F A7 E9
C770: A7 A9 55 A9 55 BA 86 00 57
C778: 00 00 00 00 00 00 00 00 78
```

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C780: 00 00 00 AC 86 00 1B 00 CE
C788: 00 00 80 D8 00 1D 00 00 FE
C790: 00 FF 00 00 00 00 0B 08 A3
C798: 0F 00 06 00 01 01 01 01 B1
C7A0: 01 01 00 01 20 86 88 87 5A
C7A8: 88 88 88 88 88 88 89 20 85
C7B0: 80 81 81 81 81 81 81 81 BB
C7B8: 81 81 81 82 83 84 85 84 D1
C7C0: 85 84 85 84 85 84 85 84 E8
C7C8: 83 85 84 85 84 85 84 85 EF
C7D0: 84 8F 90 85 83 84 85 84 0D
C7D8: 85 84 84 85 84 85 84 85 01
C7E0: A0 A0 A0 A0 A0 A0 A0 A0 E5
C7E8: A0 A0 A0 A0 A0 A0 A0 A0 ED
C7F0: A0 A0 A0 A0 A0 A0 A0 A0 F5
C7F8: 91 91 91 91 91 91 91 91 85
C800: 91 91 91 91 20 8A 8A 8A 06
C808: 20 20 20 8A 8A 8A 20 20 48
C810: 8B 8C 8D 8E 97 98 95 94 9E
C818: 95 94 03 03 02 01 03 03 51
C820: 02 01 03 03 00 02 01 06 32
C828: 06 01 03 03 02 01 03 03 3E
C830: 02 01 03 03 00 02 01 06 42
C838: 06 02 01 01 01 03 06 06 52
C840: 06 03 04 04 05 04 04 03 61
C848: 03 03 02 02 02 03 01 01 59
C850: 01 02 03 03 00 02 01 06 62
C858: 06 02 08 08 0A 0A 08 08 94
C860: 0A 0A 08 08 0A 0A 08 08 A8
C868: 08 08 08 08 0A 0A 08 08 AC
C870: 0A 0A 08 08 0A 0A 08 08 B8
C878: 08 08 08 08 08 08 08 08 B8
C880: 08 08 09 09 09 09 08 08 C4
C888: 08 08 09 09 09 09 08 08 CC
C890: 08 08 0A 0A 0A 0A 08 08 D8
C898: 07 07 18 D2 C3 D1 1F 1E 64
C8A0: 8F 47 47 61 68 0E 0F 10 B5
C8A8: 12 15 19 0C 05 06 08 09 11
C8B0: A2 00 8E 20 D0 8E 21 D0 53
C8B8: A9 93 20 D2 FF A0 00 20 A9
C8C0: CD C1 C8 C0 04 D0 F8 A0 48
C8C8: 00 BD F0 C4 9D 76 05 BD 13
C8D0: FC C4 9D 9E 05 BD 08 C5 5F
C8D8: 9D C6 05 A9 03 9D 76 D9 DC
C8E0: 9D 9E D9 9D C6 D9 E8 E0 FE
C8E8: 0C D0 D4 A2 00 20 CD C1 EC
C8F0: E8 E0 32 D0 F8 60 08 03 22
C8F8: 75 02 00 00 00 00 00 70
```



# RAMCO
## FROM PAGE 46

### RAMCO 64

```
•10 REM *** RAMCO 64 *** BUCK CHILDRESS *
**                                        NF
•20 REM *** P.O. BOX 13575 SALEM, OR 9730
9 ***                                     OA
•30 PRINTCHR$(147)"LOADING AND CHECKING D
ATA LINE:":J=49152                        EO
•40 FORB=0TO11:READA                      MB
•50 IFB=0THENL=PEEK(64)*256+PEEK(63):PRIN
TCHR$(19)TAB(31)L:PRINT                   PF
•60 IFA<0ORA>255THEN80                    FK
•70 POKEJ+B,A:X=X+A:D=D+1:NEXTB:READA:IFA
=XTHEN90                                  PL
•80 PRINT"ERROR IN DATA LINE:"L:END       MG
•90 X=0:J=J+12:IFD<372THEN40              OB
•100 PRINT"THE DATA IS OK[3"."]":PRINT    FB
•110 PRINT"SYS 49152 TO ACTIVATE[3"."]":E
ND                                        OB
•120 DATA169,19,160,193,32,30,171,169,0,1
62,2,160,1267                             KC
•130 DATA255,141,115,193,141,118,193,142,
116,193,140,117,1864                      OL
•140 DATA193,76,134,192,32,221,192,169,11
,160,193,32,1605                          BM
•150 DATA30,171,32,242,192,173,118,193,32
,210,255,32,1680                          LK
•160 DATA3,193,32,213,192,32,221,192,169,
15,160,193,1615                           ME
•170 DATA32,30,171,32,242,192,32,3,193,16
2,15,32,1136                              DD
•180 DATA198,255,32,207,255,205,118,193,2
40,15,169,103,1990                        DJ
•190 DATA160,193,32,30,171,169,0,141,115,
193,76,134,1414                           GC
•200 DATA192,72,32,213,192,104,141,99,4,1
73,134,2,1358                             EC
•210 DATA141,99,216,173,118,193,24,105,16
,141,118,193,1537                         MO
•220 DATA208,65,238,115,193,208,60,169,94
,160,193,32,1735                          MP
•230 DATA30,171,238,116,193,238,117,193,1
73,117,193,201,1980                       DH
•240 DATA5,144,8,169,32,141,99,4,76,213,1
92,169,1252                               LK
•250 DATA65,160,193,32,30,171,169,0,174,1
17,193,32,1336                            MI
•260 DATA205,189,169,81,160,193,32,30,171
,166,214,164,1774                         IH
•270 DATA211,142,119,193,140,120,193,174,
119,193,172,120,1896                      NN
•280 DATA193,24,32,240,255,169,0,174,115,
```

```
193,32,205,1632                                   FL
·290 DATA189,32,225,255,240,3,76,28,192,1
69,15,32,1456                                     KD
·300 DATA195,255,76,204,255.169.15.168,16
2,8,32,186,1725                                   MK
·310 DATA255,169,0,32,189,255,32,192,255,
162,15,76,1632                                    GF
·320 DATA201,255,173,115,193,32,210,255,1
73,116,193,32,1948                                IK
·330 DATA210,255,169,1,76,210,255,169,13,
32,210,255,1855                                   NA
·340 DATA76,204,255,77,45,87,0,77,45,82,0
,147,1095                                         GF
·350 DATA18,32,67,45,54,52,32,32,67,72,69
,67,607                                           GI
·360 DATA75,83,32,66,79,84,72,32,49,53,52
,49,726                                           IP
·370 DATA32,65,78,68,32,49,53,55,49,32,68
,82,663                                           BJ
·380 DATA73,86,69,83,32,13,13,13,0,13,13,
68,476                                            FN
·390 DATA82,73,86,69,32,66,85,70,70,69,82
,32,816                                           NF
·400 DATA0,32,42,32,76,79,67,65,84,73,79,
78,707                                            DH
·410 DATA32,0,32,42,32,79,75,46,46,46,0,3
2,462                                             GA
·420 DATA42,32,69,82,82,79,82,46,46,46,0,
0,606                                             EE
```

## RAMCO 128

```
·10 REM *** RAMCO 128 *** BUCK CHILDRESS
***                                               PL
·20 REM *** P.O. BOX 13575 SALEM, OR 9730
9 ***                                             OA
·30 PRINTCHR$(147)"LOADING AND CHECKING D
ATA LINE:":J=4864                                 AD
·40 FORB=0TO11:READA                              MB
·50 IFB=0THENL=PEEK(66)*256+PEEK(65):PRIN
TCHR$(19)TAB(31)L:PRINT                           LB
·60 IFA<0ORA>255THEN80                            FK
·70 POKEJ+B,A:X=X+A:D=D+1:NEXTB:READA:IFA
=XTHEN90                                          PL
·80 PRINT"ERROR IN DATA LINE:"L:END               MG
·90 X=0:J=J+12:IFD<348THEN40                      OO
·100 PRINT"THE DATA IS OK[3"."]":PRINT            FB
·110 PRINT"SYS 4864 TO ACTIVATE[3"."]":EN
D                                                 AJ
·120 DATA32,125,255,147,18,32,67,45,49,50
,56,32,908                                        AE
·130 DATA67,72,69,67,75,83,32,66,79,84,72
,32,798                                           NI
·140 DATA49,53,55,49,32,65,78,68,32,49,53
,52,635                                           CG
·150 DATA49,32,68,82,73,86,69,83,32,13,13
,13,613                                           IP
·160 DATA0,169,0,162,2,160,255,141,86,20,
141,89,1225                                       BH
·170 DATA20,142,87,20,140,88,20,76,188,19
,32,40,872                                        PJ
·180 DATA20,32,125,255,77,45,87,0,32,61,2
0,173,927                                         OB
·190 DATA89,20,32,105,146,32,78,20,32,32,
20,32,638                                         DM
·200 DATA40,20,32,125,255,77,45,82,0,32,6
1,20,789                                          BF
·210 DATA32,78,20,162,15,32,198,255,32,20
7,255,205,1491                                    MC
·220 DATA89,20,240,23,32,125,255,32,42,32
,69,82,1041                                       NA
·230 DATA82,79,82,46,46,46,0,169,0,141,86
,20,797                                           AD
·240 DATA76,188,19,72,32,32,20,104,141,99
,4,165,952                                        BG
·250 DATA241,141,99,216,173,89,20,24,105,
16,141,89,1354                                    BN
·260 DATA20,208,91,238,86,20,208,86,32,12
5,255,32,1401                                     FF
·270 DATA42,32,79,75,46,46,46,0,238,87,20
,238,949                                          IE
·280 DATA88,20,173,88,20,201,5,144,8,169,
32,141,1089                                       AC
·290 DATA99,4,76,32,20,32,125,255,13,13,6
8,82,819                                          FN
·300 DATA73,86,69,32,66,85,70,70,69,82,32
,0,734                                            IG
·310 DATA169,0,174,88,20,32,50,142,32,125
,255,32,1119                                      JF
·320 DATA42,32,76,79,67,65,84,73,79,78,32
,0,707                                            EJ
·330 DATA166,235,164,236,142,90,20,140,91
,20,174,90,1568                                   OA
·340 DATA20,172,91,20,24,32,240,255,169,0
,174,86,1283                                      KF
·350 DATA20,32,50,142,32,225,255,240,3,76
,70,19,1164                                       JJ
·360 DATA169,15,32,195,255,76,204,255,169
,15,168,162,1715                                  JF
·370 DATA8,32,186,255,169,0,32,189,255,32
,192,255,1605                                     PA
·380 DATA162,15,76,201,255,173,86,20,32,1
05,146,173,1444                                   CF
·390 DATA87,20,32,105,146,169,1,76,105,14
6,169,13,1069                                     KM
·400 DATA32,105,146,76,204,255,65,46,72,4
6,83,46,1176                                      BD
```

# FLASH FLOOD
## FROM PAGE 59

**Starting address in hex: C000**
**Ending address in hex: C86F**
**SYS to start: 49152**

***Flankspeed* required for entry! See page 95.**

```
C000: A9 8E 20 D2 FF A9 08 20 FC
C008: D2 FF A9 93 20 D2 FF A9 B4
C010: 6D 85 39 A9 C5 85 3A A9 15
C018: 00 85 3B A9 3C 85 3C A2 23
C020: 0C A0 00 B1 39 91 3B C8 4D
C028: C0 40 90 F7 18 98 65 39 01
C030: 85 39 A5 3A 69 00 85 3A F7
C038: 18 98 65 3B 85 3B A5 3C 2C
C040: 69 00 85 3C CA D0 DA A0 82
C048: 18 B9 32 C4 99 00 D4 88 08
C050: 10 F7 20 9B C3 A9 00 8D 0F
C058: 20 D0 A9 08 8D 17 D0 8D FD
C060: 1D D0 A9 F0 8D 1B D0 A9 0C
C068: 09 8D 25 D0 A9 0B 8D 26 5D
C070: D0 A9 07 8D 1C D0 A2 14 23
C078: A0 00 18 20 F0 FF A9 FC E8
C080: A0 C4 20 1E AB A0 27 A9 41
C088: E2 99 80 06 A9 07 99 80 56
C090: DA A9 79 99 F8 06 A9 0B DB
C098: 99 F8 DA 88 10 E9 A0 07 30
C0A0: B9 16 C4 99 F8 07 B9 1E A6
C0A8: C4 99 27 D0 88 10 F1 20 A9
C0B0: 72 C3 A9 04 8D 15 D0 A9 B1
C0B8: CF 8D E3 C3 20 0D C2 20 CD
C0C0: DF C2 A9 01 8D E6 C3 A9 EF
C0C8: 07 8D 15 D0 20 1D C3 20 64
C0D0: B2 C2 A0 07 A9 00 99 FB 2D
C0D8: C3 88 10 FA AD 1B D4 29 F6
C0E0: 07 09 18 8D 02 C4 AD E6 F1
C0E8: C3 A2 B0 C9 0A 90 06 E9 54
C0F0: 0A E8 4C EB C0 8E 36 07 A8
C0F8: 09 B0 8D 37 07 A9 FF 8D B5
C100: 15 D0 AD 8D 02 D0 FB E6 D6
C108: 03 A5 03 29 03 D0 03 20 D3
C110: 72 C1 AD FF C3 F0 06 CE 7B
C118: FF C3 4C 2C C1 38 A9 1C 14
C120: ED E6 C3 8D FF C3 20 B9 E3
C128: C1 20 46 C2 AD 1E D0 85 35
C130: 05 20 07 C2 20 13 C2 20 35
C138: 72 C3 AD 02 C4 0D 00 C4 B4
C140: D0 07 A0 03 B9 FB C3 F0 26
C148: 03 4C 02 C1 88 10 F5 20 0A
C150: B0 C1 A9 46 20 6A C3 AD AE
C158: E3 C3 C9 B6 B0 06 20 3C 93
C160: C3 4C AF C0 AC E6 C3 C8 01
C168: C0 15 B0 03 8C E6 C3 4C 75
C170: D2 C0 AD 00 DC 29 0C 4A 0E
C178: 4A A8 B9 26 C4 F0 31 18 4A
C180: 6D E7 C3 AA AD EF C3 79 1F
C188: 2A C4 D0 07 E0 19 90 20 F9
C190: 4C 97 C1 E0 3C B0 19 8E AB
C198: E7 C3 8D EF C3 8E E8 C3 C0
C1A0: 8D F0 C3 8A 29 3F 4A 4A 6A
C1A8: 4A 4A 19 2E C4 4C B5 C1 0D
C1B0: AD F8 07 29 FC 8D F8 07 12
C1B8: 60 E6 04 A2 03 BD FB C3 27
C1C0: F0 19 18 69 01 C9 BC 90 64
C1C8: 37 CE E3 C3 AC E3 C3 A9 74
C1D0: 00 C0 B6 B0 03 8D 02 C4 50
C1D8: 9D FB C3 A5 04 29 1F D0 F8
C1E0: 22 AD 02 C4 F0 1D CE 02 56
C1E8: C4 A9 01 85 04 A0 00 AD 30
C1F0: 1B D4 C9 28 B0 01 C8 9D EA
C1F8: EB C3 98 9D F3 C3 A9 1D 5D
C200: 9D FB C3 CA 10 B7 60 A5 F5
C208: 05 29 04 F0 05 A9 FA 8D 62
C210: FA C3 60 AD FA C3 C9 E4 4A
C218: 90 2B A5 05 29 02 F0 25 BF
C220: A2 03 A5 05 3D 0A C4 F0 6D
C228: 19 38 BD FB C3 E9 7C C9 27
C230: 0B B0 0F CE FA C3 86 02 11
C238: 20 7F C2 A6 02 A9 00 9D 8A
C240: FB C3 CA 10 DD 60 AD 01 C7
C248: C4 F0 04 CE 01 C4 60 AD A4
C250: 00 C4 0A 18 6D 00 C4 A8 12
C258: B9 4B C4 D0 04 8D 00 C4 49
C260: 60 8D 01 C4 A2 10 8E 04 59
C268: D4 B9 4C C4 F0 0D 8D 01 94
C270: D4 B9 4D C4 8D 00 D4 E8 5C
C278: 8E 04 D4 EE 00 C4 60 AD A1
C280: A4 07 48 AE E6 C3 A0 04 72
C288: 38 B9 A3 07 69 00 C9 3A 92
C290: 90 02 A9 30 99 A3 07 88 C9
C298: 10 EF CA D0 E9 68 CD A4 F8
C2A0: 07 F0 05 A9 CF 8D E3 C3 4C
C2A8: A0 10 8C 0B D4 C8 8C 0B 26
C2B0: D4 60 A0 00 B9 A3 07 D9 C4
C2B8: B5 07 F0 05 B0 0B 4C D4 48
C2C0: C2 C8 C0 06 90 EE 4C D4 B3
C2C8: C2 A0 05 B9 A3 07 99 B5 E4
C2D0: 07 88 10 F7 A0 05 A9 30 E7
C2D8: 99 A3 07 88 10 FA 60 A9 BA
C2E0: 85 A0 C4 20 1E AB AD 78 DB
C2E8: 04 48 A0 00 B9 79 04 99 A6
C2F0: 78 04 B9 79 D8 99 78 D8 64
C2F8: C8 C0 27 90 EF 68 8D 9F BF
C300: 04 A9 02 8D 9F D8 A9 0A 69
C308: 20 6A C3 AD 00 DC 29 10 1A
C310: D0 D4 A0 00 A9 20 99 00 B9
C318: 04 C8 D0 FA 60 A9 00 85 40
C320: 03 A6 03 E0 B0 B0 14 A9 CC
C328: 00 A0 01 20 97 C1 20 72 D5
C330: C3 A2 02 20 61 C3 E6 03 C7
C338: 4C 21 C3 60 AD E7 C3 0D 30
C340: EF C3 F0 1C 38 AD E7 C3 92
C348: E9 01 AA AD EF C3 E9 00 29
```

```
C350: A0 02 20 97 C1 20 72 C3 C2
C358: A2 02 20 61 C3 4C 3C C3 8E
C360: 60 A0 00 C8 D0 FD CA D0 94
C368: FA 60 18 65 A2 C5 A2 D0 1D
C370: FC 60 A2 07 8A 0A A8 BD 72
C378: F7 C3 99 01 D0 BD E7 C3 09
C380: 99 00 D0 AD 10 D0 3D 0E C4
C388: C4 A8 BD EF C3 F0 05 98 F5
C390: 1D 06 C4 A8 8C 10 D0 CA 59
C398: 10 DA 60 78 A9 B7 8D 14 5F
C3A0: 03 A9 C3 8D 15 03 A9 00 60
C3A8: 8D 12 D0 A9 1B 8D 11 D0 4D
C3B0: A9 81 8D 1A D0 58 60 AD BA
C3B8: 19 D0 8D 19 D0 30 07 AD FE
C3C0: 0D DC 58 4C 31 EA AD 12 2B
C3C8: D0 A0 02 D9 E2 C3 B0 03 70
C3D0: 88 D0 F8 B9 03 C4 8D 21 53
C3D8: D0 B9 E3 C3 8D 12 D0 4C C7
C3E0: BC FE 00 CF D1 00 00 00 3E
C3E8: 00 3F AA 00 00 00 00 00 D2
C3F0: 00 01 00 00 00 00 00 9C 8E
C3F8: 86 9C FA 00 00 00 00 00 17
C400: 00 00 00 00 0E 0B 01 02 1C
C408: 04 08 10 20 40 80 FE FD 02
C410: FB F7 EF DF BF 7F F4 F8 01
C418: FA FB F9 F9 F9 F9 0A 08 09
C420: 01 0E 0E 0E 0E 0E 00 01 68
C428: FF 00 00 00 FF 00 00 F4 1D
C430: F0 00 00 00 00 00 00 19 3A
C438: 0A 00 3C 00 00 00 20 00 9E
C440: FF FF 00 00 80 00 00 00 C0
C448: 00 00 8F 06 0B 30 0F 0E 36
C450: 18 12 0C 88 12 0C 88 06 BB
C458: 0B 30 0F 0E 18 12 0E 18 01
C460: 06 0E 18 0F 0C 88 0F 0B 4A
C468: 30 1B 0E 18 03 00 00 12 EE
C470: 0E 18 1B 0B 30 03 00 00 EF
C478: 06 0C 88 06 0C 88 06 0B BE
C480: 30 12 00 00 00 13 20 20 16
C488: 20 20 20 20 20 20 20 9E 08
C490: B2 AE B2 20 D5 C9 D5 C9 04
C498: AE B0 20 20 B2 AE B2 20 6C
C4A0: D5 C9 D5 C9 B2 C9 0D 20 89
C4A8: 20 20 20 20 20 20 20 20 A9
C4B0: 99 AB 20 C2 20 AB B3 CA 23
C4B8: C9 AB B3 20 20 AB 20 C2 B0
C4C0: 20 C2 C2 C2 C2 C2 C2 0D 7E
C4C8: 20 20 20 20 20 20 20 20 C9
C4D0: 20 9F B1 20 B1 BD CB CA 68
C4D8: CA CB BD AD 20 20 B1 20 EC
C4E0: B1 BD CA CB CA CB B1 CB FA
C4E8: 0D 90 50 52 45 53 53 20 35
C4F0: 46 49 52 45 20 42 55 54 24
C4F8: 54 4F 4E 00 98 12 B1 B2 F9
C500: B1 B2 B1 B2 B1 B2 B1 B2 91
C508: B1 B2 B1 B2 B1 B3 9B 4C 1E
C510: 45 56 45 4C 20 30 31 98 57
C518: AB B2 B1 B2 B1 B2 B1 B2 A3
C520: B1 B2 B1 B2 B1 B2 B1 B2 B1
C528: 0D 0D 20 20 20 20 20 99 7C
C530: 53 43 4F 52 45 20 05 30 03
C538: 30 30 30 30 30 20 90 91 6B
C540: 12 20 20 20 20 20 11 9D A1
C548: 9D 9D 9D 9D 20 20 20 20 3F
C550: 20 11 9D 9D 9D 9D 9D 20 B5
C558: 20 20 20 20 91 92 20 9E BB
C560: 48 49 47 48 20 05 30 30 07
C568: 30 30 30 30 00 A3 FF 0A D6
C570: BF D5 2A 51 65 46 1A A6 ED
C578: 8A 29 AA 4A 16 99 1A 05 EF
C580: 69 A9 0A A7 A8 0A 9F A0 38
C588: 03 7F 40 00 FF C0 00 FF 0C
C590: C0 00 FF 00 00 55 00 00 A6
C598: 3F 00 00 3F 00 00 3F 00 56
C5A0: 00 3F 00 00 00 00 00 55 35
C5A8: 00 00 55 00 26 A3 FF 0A D1
C5B0: BF D5 2A 51 65 46 1A A6 2E
C5B8: 8A 29 AA 4A 16 99 1A 05 30
C5C0: 69 A9 0A A7 A8 0A 9F A0 78
C5C8: 03 7F 40 00 FF C0 00 FF 4C
C5D0: C0 00 FF 00 00 55 00 03 E9
C5D8: FF 00 0F FF D4 0F FF D4 A0
C5E0: 0F 0F D4 00 00 04 15 00 EC
C5E8: 14 15 00 00 26 A3 FF 0A E5
C5F0: BF D5 2A 51 65 46 1A A6 6E
C5F8: 8A 29 AA 4A 16 99 1A 05 70
C600: 69 A9 0A A7 A8 0A 9F A0 B7
C608: 03 7F 40 00 FF C0 00 FF 8B
C610: C0 00 FF 00 00 55 00 03 29
C618: FF 00 03 FF 00 03 CF C0 AE
C620: 00 03 C0 05 40 50 05 41 BF
C628: 50 00 01 40 26 A3 FF 0A 8D
C630: BF D5 2A 51 65 46 1A A6 AD
C638: 8A 29 AA 4A 16 99 1A 05 AF
C640: 69 A9 0A A7 A8 0A 9F A0 F7
C648: 03 7F 40 00 FF C0 00 FF CB
C650: C0 00 FF 00 00 55 00 00 66
C658: FF 00 00 FF 50 00 3F 50 38
C660: 00 0F 50 00 00 50 00 15 25
C668: 00 00 15 00 26 A0 FF CA 0F
C670: A8 57 FE 91 59 45 A2 9A DC
C678: A4 A1 AA 68 A4 66 94 6A DB
C680: 69 50 2A DA A0 0A F6 A0 81
C688: 01 FD C0 03 FF 00 03 FF 4E
C690: 00 00 FF 00 00 55 00 00 E5
C698: FC 00 00 FC 00 00 FC 00 8F
C6A0: 00 FC 00 00 00 00 00 55 F2
C6A8: 00 00 55 00 00 A0 FF CA 69
C6B0: A8 57 FE 91 59 45 A2 9A 1D
C6B8: A4 A1 AA 68 A4 66 94 6A 1C
C6C0: 69 50 2A DA A0 0A F6 A0 C1
C6C8: 01 FD C0 03 FF 00 03 FF 8E
C6D0: 00 00 FF 00 00 55 00 00 26
C6D8: FF 00 05 FF 00 05 FC 00 DF
C6E0: 05 F0 00 05 00 00 00 54 30
C6E8: 00 00 54 00 00 A0 FF CA A8
```

**IMPORTANT!** Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 93 and 94 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
C6F0: A8 57 FE 91 59 45 A2 9A 5D
C6F8: A4 A1 AA 68 A4 66 94 6A 5C
C700: 69 50 2A DA A0 0A F6 A0 01
C708: 01 FD C0 03 FF 00 03 FF CD
C710: 00 00 FF 00 00 55 00 00 65
C718: FF C0 00 FF C0 03 F3 C0 51
C720: 03 C0 00 05 01 50 05 41 80
C728: 50 01 40 00 00 A0 FF CA 25
C730: A8 57 FE 91 59 45 A2 9A 9C
C738: A4 A1 AA 68 A4 66 94 6A 9B
C740: 69 50 2A DA A0 0A F6 A0 41
C748: 01 FD C0 03 FF 00 03 FF 0E
C750: 00 00 FF 00 00 55 00 00 A5
C758: FF C0 17 FF F0 17 FF F0 29
C760: 17 F0 F0 10 00 00 14 00 7D
C768: 54 00 00 54 00 00 00 00 11
C770: 00 00 00 00 00 00 00 00 70
C778: 00 00 00 00 00 00 00 00 78
C780: 00 00 00 00 00 00 00 00 80
C788: 00 00 00 16 69 94 3F FF DB
C790: FC 55 55 55 59 AA 65 69 60
C798: AA 69 69 AA 69 69 AA 69 A7
C7A0: 59 AA 65 FF FF FF 15 55 74
C7A8: 54 16 69 94 00 00 00 00 11
C7B0: 00 00 00 00 00 00 00 00 B0
C7B8: 00 00 00 00 00 00 00 00 B8
C7C0: 00 00 00 00 00 00 00 00 C0
C7C8: 00 00 00 00 00 00 00 00 C8
C7D0: 00 00 00 00 00 00 00 00 D0
C7D8: 00 00 00 00 00 00 08 00 E0
C7E0: 00 1C 00 00 3E 00 00 3E 79
C7E8: 00 00 1C 00 00 00 00 00 05
C7F0: 00 00 00 00 00 02 00 00 F2
C7F8: 0A 00 0F CA 00 03 0A 00 E9
C800: 0F FE 00 0C 02 00 00 0A 26
C808: 00 00 0A 00 00 0E 02 AA CC
C810: AA 02 AA AA 03 AA AA 00 6A
C818: FF FF 00 03 00 00 03 3F 5D
C820: 00 03 33 00 03 F3 00 00 4D
C828: 03 00 00 03 00 FF FF C0 EE
C830: FF FF C0 FF FF C0 FF FF B1
C838: C0 FF FF C0 FF FF C0 FF 7A
C840: FF C0 FF FF C0 FF FF C0 82
C848: FF FF C0 FF FF C0 FF FF C9
C850: C0 FF FF C0 FF FF C0 FF 92
C858: FF C0 FF FF C0 FF FF C0 9A
C860: FF FF C0 FF FF C0 FF FF E1
C868: C0 FF FF C0 FF 00 00 00 E9
```

### PROBLEMS ENTERING A PROGRAM?

*Ahoy!'s* technical department is waiting to assist you from 8:30-5:00 EST at 212-239-6089 (if busy or no answer after three rings, call 212-239-0855).

## LINE SENTRY
## FROM PAGE 50

```
·10 REM *** LINE SENTRY *** BUCK CHILDRES
 S ***                                    EI
·20 REM *** P.O. BOX 13575 SALEM, OR 9730
 9 ***                                    OA
·30 PRINTCHR$(147)"LOADING AND CHECKING D
 ATA LINE:":J=52000                       BM
·40 FORB=0TO11:READA                      MB
·50 IFB=0THENL=PEEK(64)*256+PEEK(63):PRIN
 TCHR$(19)TAB(31)L:PRINT                  PF
·60 IFA<0ORA>255THEN80                    FK
·70 POKEJ+B,A:X=X+A:D=D+1:NEXTB:READA:IFA
 =XTHEN90                                 PL
·80 PRINT"ERROR IN DATA LINE:"L:END       MG
·90 X=0:J=J+12:IFD<288THEN40              MD
·100 PRINT"THE DATA IS OK[3"."]":PRINT    FB
·110 PRINT"SYS 52[3"0"] TOGGLES ON AND OF
 F[3"."]":END                             DI
·120 DATA104,104,169,60,162,203,236,1,3,2
 08,4,169,1423                            FO
·130 DATA139,162,227,141,0,3,142,1,3,224,
 227,240,1509                             GO
·140 DATA40,76,79,203,134,251,173,1,2,240
 ,5,166,1370                              PP
·150 DATA251,76,139,227,173,0,2,201,79,20
 8,14,169,1539                            DJ
·160 DATA14,160,204,32,30,171,169,117,162
 ,203,76,108,1446                         JO
·170 DATA203,201,81,208,226,169,17,160,20
 4,32,30,171,1702                         LO
·180 DATA169,131,162,164,141,2,3,142,3,3,
 76,116,1112                              DH
·190 DATA164,32,96,165,134,122,132,123,32
 ,115,0,170,1285                          HC
·200 DATA240,243,162,255,134,58,144,3,76,
 150,164,32,1661                          AK
·210 DATA107,169,32,121,165,132,11,32,19,
 166,176,3,1133                           KI
·220 DATA76,237,164,166,214,164,211,134,2
 51,132,252,162,2163                      KF
·230 DATA39,189,0,4,157,57,204,189,0,216,
 157,97,1309                              JE
·240 DATA204,169,32,157,0,4,202,16,236,16
 9,21,160,1370                            DK
·250 DATA204,32,30,171,165,21,166,20,32,2
 05,189,169,1404                          HM
·260 DATA29,160,204,32,30,171,169,0,133,1
 98,32,228,1386                           FC
·270 DATA255,201,78,240,4,201,89,208,245,
 32,210,255,2018                          LB
·280 DATA72,160,0,232,208,253,200,208,250
```

```
,162,39,189,1973                                    LH
•290 DATA57,204,157,0,4,189,97,204,157,0,
216,202,1487                                        JN
•300 DATA16,241,166,251,164,252,24,32,240
,255,104,201,1946                                   KM
•310 DATA89,240,3,76,123,164,56,76,169,16
4,79,78,1317                                        ME
•320 DATA0,79,70,70,0,19,18,76,73,78,69,3
2,584                                               PO
•330 DATA0,32,69,88,73,83,84,83,32,42,32,
67,685                                              GN
•340 DATA79,78,84,73,78,85,69,63,32,40,89
,47,817                                             GB
•350 DATA78,41,146,32,0,0,65,46,72,46,83,
46,655                                              LE
```

## AMIGA SECTION

*Continued from page 58*

al object.

If you are working from a drawing or plan, you can turn on a fourth window in addition to the three views. This new window will give exact measurements from point to point as you draw each line.

When you object is finished, you select the number, location, color, and brightness of the lamps that will illuminate it. If the image would benefit from non-direct ambient lighting, you can have that too.

If you'd like a sky, it can be any solid color or graduated from one color at the horizon to another at the zenith. Ground, if you choose it, can be solid or checkered. Checkered is great for providing perspective and is particularly effective with mirrored images.

If you haven't figured it out by now, I love this program. It has let me do graphics that I never could have pulled off before. And exploring your scenes from any possible perspective is fascinating. *Sculpt 3-D* is delivered with no copy protection. It also comes with support unbundled–meaning that phone calls to Byte by Byte for help will set you back $75 an hour.

*Sculpt 3-D* is pretty smart. It moves program modules in and out of memory to accommodate the working space you need. To produce shading, it will automatically pick the best colors to show off your creation. If you're determined to use more colors than the Amiga can display, *Sculpt 3-D* is ready. It can create files with hundreds of colors, but you will need a hardware Frame Buffer to display them.

Many of the most common commands are available with one or two keystrokes as an alternative to the mouse. *Sculpt 3-D* will multitask; however, given the memory requirements of this sophisticated graphics program, you may not want to. When you choose to create an image, *Sculpt 3-D* will give you an estimate of the time it will take. Images can be printed using the Amiga's GraphicDump program.

The images you create with *Sculpt 3-D* are IFF-compatible and can be used with other graphics programs. Although the 97-page manual just walks you through the program's features and does not focus on specific applications, I can imagine *Sculpt 3-D* being useful to designers, artists, photography teachers, or people like me who just want a great toy to play with.

Byte by Byte, Arboretum Plaza II, 9442 Capital of Texas Highway North –Suite 150, Austin, TX 78759 (phone: 512-343-4357). ***–Richard Herring***

## TIPS AHOY!

*Continued from page 40*

goodies on the screen. Next type SYS 53000, press RETURN, and watch the action.

*Rock 'n Roll* can be relocated by changing the variable A in line 63000. Be sure you have enough room in your new location (127 bytes) and that you SYS to the new address.

–Buck Childress
Salem, OR

```
•63000 A=53000:REM *** CHANGE A TO RELOCA
TE ***
•63002 FORB=ATOA+126:READC:POKEB,C:D=D+C:
NEXTB
•63004 IFD<>16748THENPRINT"ERROR IN DATA[
3"."]":END
•63006 DATA169,0,133,2,173,18,208,208,251
,173,17,208
•63008 DATA9,4,141,17,208,164,2,202,208,2
53,136,16
•63010 DATA250,173,18,208,208,251,169,27,
141,17,208,173
•63012 DATA22,208,9,4,141,22,208,164,2,20
2,208,253
•63014 DATA136,16,250,173,18,208,208,251,
169,200,141,22
•63016 DATA208,173,18,208,208,251,173,17,
208,9,4,141
•63018 DATA17,208,173,22,208,9,4,141,22,2
08,164,2
•63020 DATA202,208,253,136,16,250,173,18,
208,208,251,169
•63022 DATA27,141,17,208,169,200,141,22,2
08,164,2,192
•63024 DATA37,144,1,96,202,208,253,136,16
,250,230,2
•63026 DATA230,2,208,136,65,72,83
```

### 128 TEXT MODE SPLIT BACKGROUND

This little routine divides the 128's text mode screen in two by displaying separate background colors in each half. It's a nice addition when you're using the WINDOW command to divide the screen into separate zones, each dealing with a different aspect of a program. For a really nice look, position the split in the middle of a line of text filled with SHIFTed *'s. The program lines below POKE the code into place. Enable the split with SYS2816 followed by three parameters separated by commas: the position of the split (0-200); color code for the top half (1-16); color for the bot-

tom half (0-16). Disable and return to regular text mode with SYS2819. —R. Harold Droid
Seattle, WA

```
10 REM 128 TEXT SPLIT BACKGROUND
20 REM SYS2816,LINE#(0-200),COLOR1,COLOR
 2; SYS2819 DISABLES
30 SUM=0:FORI=2816TO2935:READJ:POKEI,J:S
 UM=SUM+J:NEXT:IFSUM<>11782THENPRINT"ERRO
 R IN DATA STATEMENTS":END
2816 DATA 76,6,11,76,39,11,120,24
2824 DATA 105,49,141,120,11,142,121,11
2832 DATA 140,122,11,169,58,141,20,3
2840 DATA 169,11,141,21,3,173,33,208
2848 DATA 41,15,141,123,11,88,96,120
2856 DATA 169,101,141,20,3,169,250,141
2864 DATA 21,3,173,123,11,141,33,208
2872 DATA 88,96,169,250,72,169,104,72
2880 DATA 216,56,173,25,208,41,1,208
2888 DATA 3,76,20,194,141,25,208,173
2896 DATA 17,208,48,7,173,18,208,201
2904 DATA 49,144,14,169,1,141,18,208
2912 DATA 173,122,11,141,33,208,76,117
2920 DATA 11,173,120,11,141,18,208,173
2928 DATA 121,11,141,33,208,76,22,194
```

## MAZE

The C-64 has one of the easiest ways of making a maze that I know of. Just use the shifted M and N keys in a random sequence and you will have an interesting maze each time.

In the listing below, I have taken advantage of this idea by adding a simple sprite and a basic joystick operation. This little program is great for starting much more complicated maze games. After you have typed this in, you can add any kind of boundaries or limits that you like.

—Marty Grebing
Cape Girardeau, MO

```
0 PRINT CHR$(147)
10 X=128:Y=100:FOR I=1024 TO 2023
20 A=RND(1):IF A>.49 THEN POKE I,77:NEXT
30 IF A<.5 THEN POKE I,77:NEXT
40 V=53248
50 FOR I=832 TO 832+61:POKE I,0:NEXT:POK
 E 832+62,3
60 POKE 2040,13:POKE V+21,1:POKE V+39,1
70 POKE V,X:POKE V+1,Y
80 J=PEEK(56320):REM PORT 2
90 IF (JAND1)=0 THEN Y=Y-1:X=X+1
100 IF (JAND2)=0 THEN Y=Y+1:X=X-1
110 IF (JAND4)=0 THEN Y=Y-1:X=X-1
120 IF (JAND8)=0 THEN Y=Y+1:X=X+1
130 GOTO 70
```

## STAGGERING

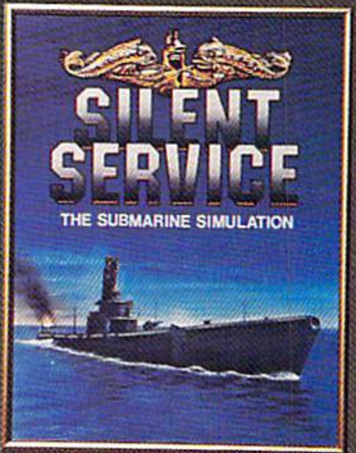
This BASIC routine for the C-128 will display a phrase of up to 40 characters in a staggered format on the high resolution screen. This technique can be useful for creating interesting introductory screens. NOTE: By displaying each character with the GSHAPE statement, more precise centering can be accomplished. —Michael Jaecks
Alamogordo, NM

```
1 SCNCLR
2 INPUT"PHRASE";A$
3 GRAPHIC1,1
4 A$=LEFT$(A$,40)
5 L=LEN(A$)
6 TB=INT((320-(L*8))/2)
7 CHAR,0,0,A$
8 FORX=0TOL-1
9 SSHAPEB$,X*8,0,X*8+7,7
10 CHAR,X,0," "
11 IFA=0THENA=1:Y=0:ELSE:A=0:Y=1
12 GSHAPEB$,X*8+TB,Y+95
13 NEXTX
14 GETKEYA$
15 GRAPHIC0
16 END
```

## 128 SLOW SCROLL

When I'm looking for a certain program line, I list the program and use the NO SCROLL key to start and stop the scrolling action. When I want to scroll the listing slow enough to read, I press ESC A (the Auto-insert sequence) and type LIST. This causes the cursor to slow the scroll down to one tenth of the normal speed. This is really handy for searches, especially when you're in 80 column mode. To return to the standard scroll speed, just press ESC C (the insert cancel) and all is well. —Jerome E. Reuter
Ladson, SC

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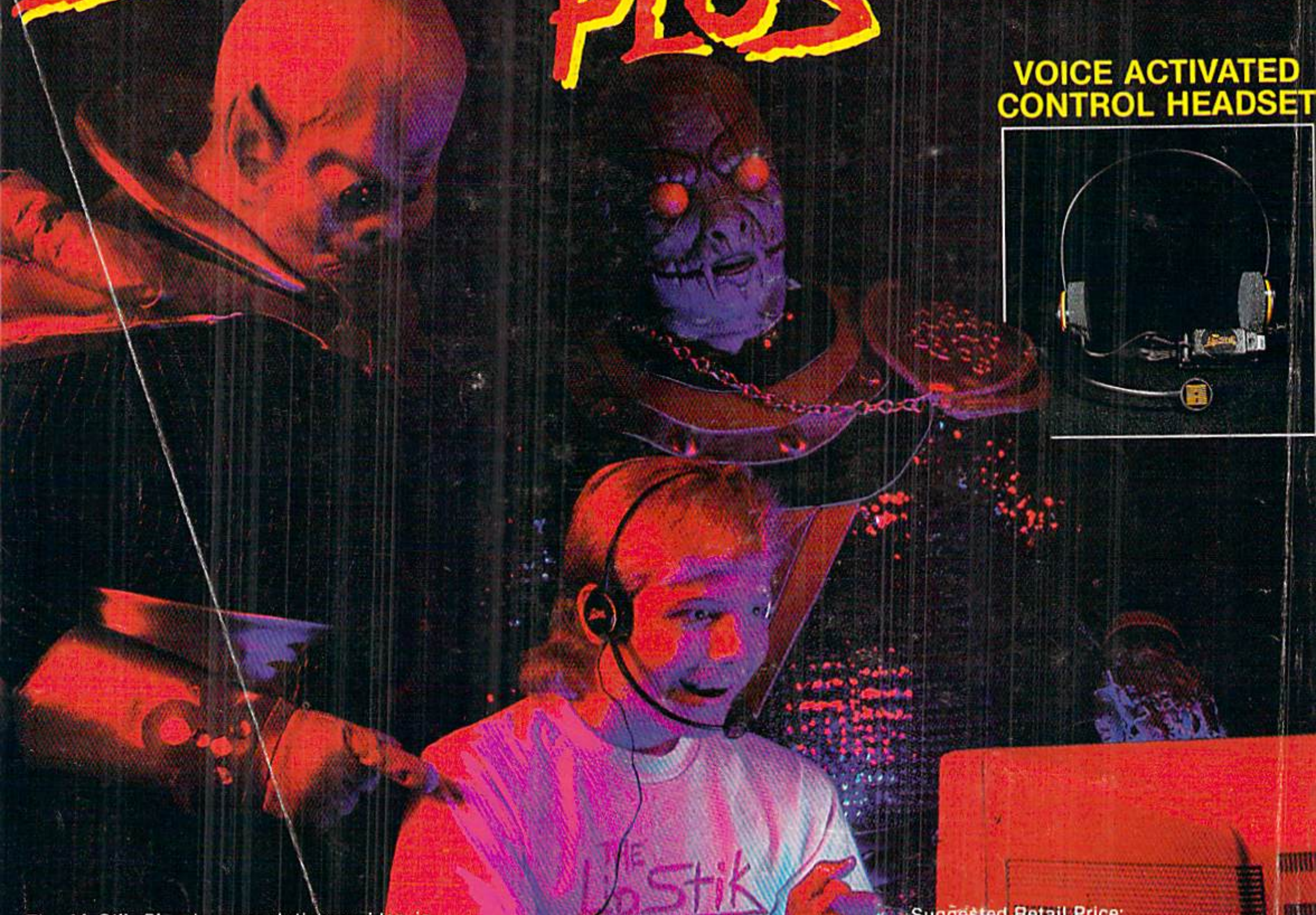


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